| OFF<br>NAVAL   | ICE OF  | (E)                                 | MODIFI  1. INSTRUMENT TYPE: Grant 2. AUTHORITY: |                         |   | Of:<br>87:<br>Ar:<br>3b. C | 5 North                       | Naval Rese<br>Randolph S<br>, VA 22203-           | Street                   |          |
|--|---|-------------------------------------|---|-------------------------|---|----------------------------|-------------------------------|---|--------------------------|----------|
|  |   |                                     | 10 USC 2358, 31                                 | USC                     | 6304  |                            | . 110                         |   |                          |          |
| 4. AWARD NO.:<br>N00014-12-1   | ການຄ  |                                     | 5. MODIFICATION NO.:                            | 6. MOD<br>Nev           | DIFICATION TYPE:  |                            | R NO.:<br>L2PR039             | 39-00   |                          |          |
| 8. ACTIVITY/AGENCY   |   | AL NO.:                             | 9. RECIPIENT PROPOSAL                           | NO.                     | 10. PROPOSAL I  |                            | 11. ACTI                      | VITY TYPE:  | 12. PROGR                | AM TYPE: |
| N/A  | 13b. CAG  | =, [12 <sub>0</sub>                 | N/A<br>DI/EFT NUMBER:                           | 14 REMI                 | 27-SEP-11 TTANCE ADDRES   |                            | FFERENT                       | FROM BLOCK 1                                      | onr<br>13):              |          |
| 13, ISSUED TO<br>13a, ADDRESS:   | 180. CAG  | · ·                                 | 8AB   |                         | e as block  |                            |                               |   |                          |          |
| UNIVERSITY OFFICE OF GI<br>ADMINISTRAT:<br>70 BUTTERFII<br>AMHERST, MA | RANT AI<br>ION<br>ELD TEI<br>01003<br>ICE CONT<br>SPRAGUI | ND CONTRA<br>RRACE<br>-9333<br>ACT: | CT  |                         |   |                            |                               |   |                          |          |
| 13e, TELEPHONE NU<br>(413) 545069                                      |   | 13f, EMAIL AD spragueeresg          | DRESS:<br>s.umass.edu                           |                         |   |                            |                               |   |                          |          |
|  |   | DESCRIPTIO                          | N OF PROJECT AND/OR PRO<br>Metallic-Like Cond   | POSAL T<br>uctivi       | ITLE:<br>ity of Micro   | obial                      | Nanow                         | íres  |                          |          |
| 16. FUNDING  |   | ACTIVIT                             | VAGENCY SHARE RECI                              | PIENT SI                | HARE .  |                            | TOTAL                         | 17. CURRENT I                                     |                          | RIOD     |
| PREVIOUSLY OBLIG   | ATED:   |                                     | \$.00   | 4                       | \$.00   |                            | \$.00                         |   | A<br>THROUGH             |          |
| OBLIGATED BY THIS  |   |                                     | \$50,000.00                                     | Ş                       | .00   | \$50,0                     | 00.00                         | N   | /A                       |          |
|  |   | D.                                  |   | غ                       | 3.00  | \$50.0                     | 00.00                         | 18. PERIOD OF                                     | PERFORMA                 | NCE      |
| TOTAL OBLIGATED  | ON AWAR   | D:                                  | \$50,000.00                                     | •                       |   |                            |                               |   | 01-JAN-1<br>THROUGH      |          |
| FUTURE FUNDING:  |   | ;                                   | \$588,349.00                                    | \$                      | \$.00 \$  | \$588,3                    | 49.00                         |   | 31-DEC-1                 | 4        |
| GRANT TOTAL:   |   | ;                                   | \$638,349.00                                    | \$                      | \$.00 \$  | 638,3                      | 49.00                         |   |                          |          |
| 19. ACCOUNTING A<br>See attached                                       | ND APPRO  | PRIATION DA                         | ounting Data Sheet                              |                         |   |                            |                               |   |                          |          |
| 20a. PRINCIPAL INV   | ESTIGATO  | R/RECIPIENT                         |   | 21, TECH                | HNICAL REPRESE<br>VIE: Linda A.                                       | ENTATIV.                   | E                             |   | 21b. CODE:<br>ONR 3      | 42       |
| TECHNICAL REPREDEREK R LOVL  |   | Е.                                  |   | 21c. ADE<br>Offi<br>875 |   | l Rese                     | arch<br>Street                |   |                          |          |
| 20b. TELEPHONE N   | UMBER:  | 20c. EMAIL A                        | ODRESS:   | 21d. TEL                | EPHONE NUMBE  | R:                         |                               | 21e, EMAIL AD                                     | DRESS:                   |          |
| (413) 54596  | 51  |                                     | robio.umass.edu                                 |                         | 3) 696-4504   |                            |                               | CHRISEL@ONR.1                                     | NAVY . MIL<br>23b. CODE: |          |
| 22. AWARDING OFF<br>22a. NAME: Eliza                                   | ICE CONT  |                                     | 22b. CODE:<br>ONR BD025                         | 23a. ADI                | MINISTRATIVE OF   | FFICE:                     |                               |   | 236. CODE:<br>N628'      | 79       |
| 22c. ADDRESS:<br>Office of Na<br>875 North Ra<br>Arlington, V          | aval Re<br>andolph<br>/A 2220<br>UMBER:                   | search<br>Street<br>3-1995          | DDRESS:   | 495<br>BOST<br>PHON     | REG BOSTON<br>SUMMER STRE<br>ON, MA 0223<br>IE: (617) 75<br>(617) 753 | EET RO<br>10-210<br>53-328 | OOM 627<br>09                 | 7   |                          |          |
| (703) 696-2!<br>24, SUBMIT PAYME                                       | NT REQU   |                                     | 25a, PAYING OFFICE:                             | 25b, CO                 |   | 26a                        | , PATENT                      | OFFICE:   | 26b, CODE:<br>NO 0 0     | 14       |
| Same as bloc   |   |                                     | DFAS COLUMB-NAVY<br>COLUMBUS, OH 4321           | ACQ H                   | 00251<br>Q0251  | AT<br>On<br>87             | TN: ONR<br>e Liber<br>5 North | Naval Reserved<br>BDCC<br>ty Center<br>Randolph S | earch<br>Street, Su      |          |

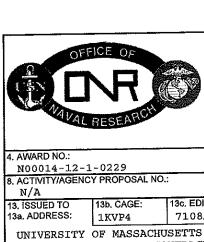
| AWARD NO.   | Δ\ΜΔ                                     | RD/MODIFIC                     | ATION  | MODIFICATION NO.  |   |
|---|--|--------------------------------|--|---|---|
| N00014-12-1-0229  |  |                                | · · · · · · · · ·  |   |   |
| 27. SPECIAL INSTRUCTIONS:   | -  |                                |  |   |   |
| See "Special Requirements"  | Attachment                               |                                |  |   |   |
|   |  |                                |  |   |   |
| 28. DELEGATIONS: The administration duties li   | sted below have !                        | been delegated to the adm      | inistrative office (bl   | ock 23a). Upon request the awarding   | office contact (block 22)                     |
| will make their full text available. Please direct q  | uestions to the co                       |                                |  | /Contracts-Grants/Regional  |   |
|   |  | nccp.// www                    | · Office in the state of the st | ,   |   |
| Full Delegation   |  |                                |  |   |   |
|   |  |                                |  |   |   |
|   |  |                                |  |   |   |
|   |  |                                |  |   |   |
| 29. TERMS AND CONDITIONS: The following to  | and an alter                             | incorporated hospin            | by reference with  | the came force and effect as if they w  | ere given in full text.                       |
| 29. TERMS AND CONDITIONS: The following to<br>Upon request the awarding office contact named      | erms and condidu<br>i in block 22 will r | make their full text available | e, or they can be fo   | und as described below.   | 510 gitteri iii tani tani                     |
| DOCUMENT  |  |                                |  |   |   |
| The following documents may be http://www.onr.navy.mil/Contrac                                    | found at:<br>te-Grants/s                 | ubmit-proposal/gr              | ants-proposa   | l/grants-terms-conditions   | .aspx   |
| http://www.onf.navy.mii/concrac   | CS-GIGHES/ D                             | apure proposary 3-             | <b>F</b>   |   | -   |
| UAAC Acceptance C November 2003   |  |                                |  |   |   |
| Agency Specific February 2011<br>UAWA Award A November 2003                                       |  |                                |  |   |   |
| Core June 2011  |  |                                |  |   |   |
|   |  |                                |  |   |   |
|   |  |                                |  |   |   |
|   |  |                                |  |   |   |
| 30. OPTIONS OPTION NO.  |  | AMOUNT                         |  | PERIOD  |   |
| (1)   |  |                                |  |   |   |
| (2)   |  |                                |  |   |   |
| (3)   | •  |                                |  |   |   |
| / <b>/</b> \  |  | <u>.</u>                       |  |   |   |
| 31. REPORTS: The following reports must be si<br>the project. Final Technical Reports must have a | ubmitted to the in                       | dicated addressees, in the     | indicated quantitie  | s, within 90 days following the expirati<br>nless otherwise stated in the award/m | on or termination of<br>odification, complete |
| the project. Final Technical Reports must have a Block 12a of the SF298 as follows: "Approved for | a Srzee, Report i<br>or Public Release   | ; distribution is Unlimited".  | inpanying aloni.   | mood outstrilled states in the arrangement  | •••••••••                                     |
| ADDRESSEE   |  | REPORT TYPE                    |  |   | COPIES  |
| See block #21   |  | Final Technica                 | l Report wi  | th SF298  | 1   |
| See Diock #21   |  | i .                            | ch Performa  | nce Report (As Require  | ed) 1   |
|   |  | with SF298                     |  |   |   |
|   |  |                                |  |   |   |
|   | ·····                                    | Penert of Tryes                | ntions and   | Subcontracts - DD 882   | 1.  |
| See block #23a  |  | Final Technica                 |  | Bubbonitzaeth 22 ton  | i   |
|   |  | Interim Resear                 | ch Performa  | nce Report (As Require  | ed) 1   |
|   |  | Final Federal                  | Financial S  | tatus Report - SF425  | - 1   |
|   |  | Including Line                 |  |   |   |
| Defense Technical Informati   | on Center                                | Final Technica                 | l Report wi  | th SF298  | 1   |
| 8725 John J Kingman Road St   | e 0944                                   |                                | ch Performa  | nce Report (As Require  | ed) 1   |
| Fort Belvoir, VA 22060-6218   |  | with SF298                     |  |   |   |
|   |  |                                |  |   |   |
| See block #26a  |  | Report of Inver                | ntions and   | Subcontracts - DD 882   | 1   |
| Dec Brook #200  |  | _                              |  |   |   |
|   |  |                                |  |   |   |
|   |  |                                |  |   |   |
|   |  | Final Technica                 | 1 Bonost   |   | 1   |
| Naval Research Laboratory   |  | Interim Resear                 | ch Performa  | nce Report (As Require  |   |
| ATTN: CODE 5596<br>4555 Overlook Avenue SW  |  | with SF298                     | 011 1011011110   | , , , , , , , , , , , , , , , , , , ,   |   |
| Washington, DC 20375-5320   |  |                                |  |   |   |
|   |  |                                |  |   |   |
| 32 FOR THE RECIPIENT  |  | 33.                            | FOR THE UNITED   | STATES OF AMERICA   |   |
| 32a. SIGNATURE OF PERSON AUTHORIZED   | TO SIGN                                  | 33a<br>(b)                     | i. SIGNATURE OF<br>(6)   | AWARDING OFFICER  |   |
| N/A - SIGNATURE NOT REQUI   | RED ON THI                               |                                |  |   |   |
|   |  |                                |  |   |   |
| 32b. NAME AND TITLE OF SIGNER   | 3  | 2G DATE SIGNED 33b             | NAME AND TITL  | E OF AWARD OFFICER  | 33c. DATE SIGNED                              |
|   |  | 1                              | lizabeth Fo  | rd  | 13-JAN-12                                     |

| NO 0 14 - 12 - 1 - 0 2 2 9  NO 0 14 - 12 - 1 - 0 2 2 9  CLINSLIN A. B. LINE OF ACCOUNTING ACRI (CRTICAL) (CRTICAL) (CRTICAL) (CRTICAL)  PREPAREDIAUTORIZED BY: |
|--|
|--|

ONR AWARD FORM (10/99) - version 1.1

| Control of the contro | NAVY INTERNAL<br>USE ONLY<br>REF DOC/ACRN |                        |  |   | r Reviewed                               |        |
|--|---|------------------------|--|---|--|--------|
|  | AMOUNT<br>(CRITICAL)                      |                        | \$.00  | \$.00   | for COMPTROLLER, ONR CONTRACT REVIEWED   |        |
| SRTICAL) 4 PR NUMBER<br>12PR03939-00   | ø.  | is intentionally blank | PAGE TOTAL   | GRAND TOTAL   | FOR FISCAL DATA AND SIGNATURE  BY  DATE: | DAI E. |
| NTICAL) 2 SPIIN (CRITICAL) 3. MOD (CRITICAL)   | 7. ACCOUNTING CITATION                    | This page              | The second secon |   |  |        |
| 1. CONTRACT NUMBER (CRITICAL) N00014-12-1-0229   | 5. 6. ACRN CLINSLIN (CRITICAL)            |                        |  | A department of the second of | PREPAREDIAU I HORIZED BY:                | DATE   |

| AWARD NO.        | SPECIAL REQUIREMENTS | MODIFICATION NO. |
|------------------|----------------------|------------------|
| N00014-12-1-0229 |                      |                  |
| •                |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      | 1                |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
| ·                |                      | ·                |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      | -                |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
| ·                |                      |                  |
|                  |                      |                  |
|                  | ·                    |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |
|                  |                      |                  |



3a, ISSUED BY: Office of Naval Research 875 North Randolph Street

|   |                               |                               | MODI                                 | FICA                       | TIOI  | V                        | Arli                | ngton                    | , VA 22203   | 3-1995               |             |
|---|-------------------------------|-------------------------------|--------------------------------------|----------------------------|---|--------------------------|---------------------|--------------------------|--|----------------------|-------------|
|   | I V                           | CI                            | 1. INSTRUMENT TYP                    |                            |   |                          | b. CFC<br>12        | A:<br>.300               |  |                      |             |
| VAL   | RESEA                         |                               | 2. AUTHORITY:<br>10 USC 2358,        | 31 USC 6                   | 5304  | i                        | c, DUN              | IS NUM                   | BER:   |                      |             |
| . AWARD NO.:<br>N00014-12-1                                   | -0229                         |                               | 5. MODIFICATION NO<br>P00006         | D.: 6. MOD                 | IFICATION TY<br>rement  |                          |                     | PR020                    | 66-00  | Lia 22002            | ALL TOUR    |
| ACTIVITY/AGENC  |                               | SAL NO.:                      | 9, RECIPIENT PROP                    | ÖSAL NÖ.:                  | 10. PROPOS  |                          | : 1                 | 1. ACTI                  | /ITY TYPE:   | 12, PROGRA           | ANTYPE:     |
| N/A<br>3. ISSUED TO<br>3a. ADDRESS:                           | 13b. CAGI<br>1KVP4            | E: 13c. EC                    | DI/EFT NUMBER:                       |                            | TTANCE ADD<br>e as bloc   | RESS (IF                 |                     | ERENT                    | FROM BLOCK   | ( 13):               |             |
| UNIVERSITY OFFICE OF G ADMINISTRAT 70 BUTTERFI AMHERST, MA    | RANT AI<br>ION<br>ELD TEI     | ND CONTRAC                    | 3 AMHERST<br>CT                      |                            |   |                          |                     |                          |  |                      |             |
| 3d, BUSINESS OFF  | SPRAGUI                       | E                             |                                      |                            |   |                          |                     |                          |  |                      |             |
| 13e. TELEPHONE NI<br>(413) 54506                              | 98                            | 13f. EMAIL ADD                | AT THE STANDIOD                      | DDODOSAL TI                | T1 E1   |                          |                     |                          |  |                      |             |
| 15. RESEARCH TITL<br>Mechanisms                               | EAND/OR<br>Underly            | ying the N                    | OF PROJECT AND/OR<br>Metallic-Like C | onductivi                  | ty of Mi  | crobi                    | al N                | ianow:                   | ires   |                      |             |
| 16. FUNDING   |                               | ACTIVITY/                     | AGENCY SHARE                         | RECIPIENT SH               | IARE  |                          | T                   | OTAL                     |  | FUNDING PER          | RIOD        |
| PREVIOUSLY OBLIG  | ATED:                         | \$                            | 540,791.00                           | \$                         | .00   | \$540                    | ,791                | 00                       |  | N/A<br>THROUGH       |             |
| OBLIGATED BY THIS   | S ACTION:                     |                               | \$97,558.00                          | \$                         | .00   | \$97                     | , 558               | .00                      |  | N/A                  |             |
| TOTAL OBLIGATED   |                               |                               | 638,349.00                           | \$                         | .00   | \$638                    | ,349                | 00.0                     | 18. PERIOD C   | OF PERFORMAL         |             |
| FUTURE FUNDING:   |                               | ,                             | \$.00                                | \$                         | 3.00  |                          | Ś                   | \$.00                    |  | 01-JAN-1:<br>THROUGH |             |
| GRANT TOTAL:  |                               | \$                            | 638,349.00                           | \$                         | 5.00  | \$638                    | ,349                | 00.                      |  | 31-DEC-1             | 4           |
| 19, ACCOUNTING A<br>See attached                              | ND APPRO<br>d Finar           | PRIATION DA                   | A:<br>unting Data Sh                 | eet (s)                    |   |                          |                     |                          |  |                      |             |
| 20a. PRINCIPAL INV  | /ESTIGATO                     | OR/RECIPIENT                  |                                      |                            | NICAL REPR  |                          |                     |                          |  | 21b. CODE:           |             |
| TECHNICAL REPRE<br>DEREK R LOVI                               | SENTATIV                      | Æ:                            |                                      | 21c. ADD<br>Offic<br>875 1 | ME: <u>Linda</u><br>PRESS:<br>ce of Nav<br>North Ran<br>ngton, VA | val Re                   | sea:<br>1 St:       | rch<br>reet              |  | ONR 3                | 42          |
| 20b. TELEPHONE N  | UMBER:                        | 20c. EMAIL AD                 | DRESS:                               | 21d. TEL                   | EPHONE NUM  | VBER:                    |                     |                          | 21e. EMAIL A   | DDRESS:              |             |
| (413) 54596   |                               | 1                             | obio.umass.edu                       |                            | ) 696-45  |                          |                     | <b></b>                  | LINDA.CHRIS  | SEY@NAVY.MIL         | <del></del> |
| 22. AWARDING OFF  | ICE CONT                      | TACT<br>Ford                  | 22b, CODE:<br>ONR BD255              | 23a. ADN                   | MINISTRATIVE  | E OFFICE                 | <b>:</b> :          |                          |  | 23b. CODE:<br>N628   | 79          |
| 22c. ADDRESS:<br>Office of No<br>875 North Ra<br>Arlington, V | aval Re<br>andolph<br>VA 2220 | search<br>Street<br>3-1995    |                                      | 495<br>BOST<br>PHON        | REG BOST<br>SUMMER S'<br>ON, MA 0<br>E: (617)<br>(617) 7          | TREET<br>2210-:<br>753-: | ROO<br>2109<br>3283 | M 621                    | 7  |                      |             |
| 22d. TELEPHONE N<br>(703) 696-2                               |                               | 22e. EMAIL AL<br>ELIZABETH, P | DRESS:<br>DROGNAVY.MIL               |                            |   |                          |                     |                          |  | · 1.25.              |             |
| 24. SUBMIT PAYME  | NT REQU                       | ·                             | 25a. PAYING OFFICE:                  | 25b, COI                   |   |                          | 26a. F              | ATENT                    | OFFICE:  | 26b. CODE:<br>NO 0 0 | 14          |
| Same as bloo  | ck #23a                       | <b>.</b>                      | DFAS COLUMB. 1<br>COLUMBUS, OH       | NORTH ENT                  | <u>00337</u><br>L-HQ0337<br>6                                     |                          | ATTN<br>One<br>875  | l: ONE<br>Liber<br>North | Naval Re<br>BDCC<br>ty Center<br>Randolph<br>, VA 2220 | search<br>Street, Si |             |

| AWARD NO.  | AWARD/MODIF                          | ICATION  | MODIFICATION NO.                          |   |
|--|--------------------------------------|--|---|---|
| N00014-12-1-0229   | , ter, transition                    |  | E00008                                    |   |
| 27. SPECIAL INSTRUCTIONS:<br>See "Special Requirements" At   | tachment                             |  |   |   |
| See "Special Requirements" At  | .cacimeiic                           |  |   |   |
|  |                                      |  |   | -ffice contest (blash on)                         |
| 28. DELEGATIONS: The administration duties lists   | d below have been delegated to the   | administrative office (                            | (block 23a). Upon request the awarding    | office contact (DIOCK 22)                         |
| will make their full text available. Please direct que   | http://                              | /www.onr.navy.mi                                   | 1/Contracts-Grants/Regional               | -contacts.aspx                                    |
| Full Delegation  |                                      |  |   |   |
|  |                                      |  |   |   |
|  |                                      |  |   |   |
|  |                                      |  |   |   |
|  |                                      | t- bu safaranga wili                               | the same force and effect as if they w    | vere given in full text                           |
| 29. TERMS AND CONDITIONS: The following ten<br>Upon request the awarding office contact named in   | ns and conditions are incorporated r | nerein by reference wit<br>allable, or they can be | found as described below.                 | , c, o g, t o i i i i i i i i i i i i i i i i i i |
| DOCUMENT   |                                      |  |   |   |
| The following documents may be for http://www.onr.navy.mil/Contracts   | ound at:<br>Grants/submit-proposal   | /grants-propos                                     | al/grants-terms-condition                 | s.aspx  |
|  |                                      |  |   |   |
| Standard Terms and Conditions for<br>Standard Terms and Conditions for   | Research Grants - June               | : 2011 (Core)<br>marv 2011 (Age                    | mcv Specific)                             |   |
| Standard Terms and Conditions to<br>UACC Acceptance C  | Research Granes 1002                 |  |   |   |
| UAWA Award A   |                                      |  |   |   |
|  |                                      |  |   |   |
|  |                                      |  |   | '   |
|  |                                      |  |   |   |
| 30, OPTIONS OPTION NO.   | AMOUNT                               |  | PERIOD                                    |   |
| (1)  |                                      |  |   | •   |
| (2)  |                                      | •  |   |   |
| (3)  |                                      |  |   |   |
| (4) 31. REPORTS: The following reports must be sub   | mitted to the indicated addressees,  | in the indicated quanti                            | ties, within 90 days following the expira | tion or termination of                            |
| 31. REPORTS: The following reports must be sub<br>the project. Final Technical Reports must have a<br>Block 12a of the SF298 as follows: "Approved for | SPYSK RENOTHIOGORDSHOUGH FOUR        | , accountipantients around                         | Unless otherwise stated in the award/r    | nodification, complete                            |
| ADDRESSEE  | REPORT TYPE                          |  |   | COPIES  |
|  |                                      | ical Report v                                      | vith SF298                                | 1   |
| See block #21  | Interim Res                          | earch Perform                                      | nance Report (As Requir                   | ed) 1   |
|  | with SF298                           |  |   |   |
|  |                                      |  |   |   |
|  | Demonst of T                         | numentions and                                     | d Subcontracts - DD 882                   | 1   |
| See block #23a   | Final Techn                          | ical Report  |   | 1   |
|  | Interim Res                          | earch Perform                                      | mance Report (As Requir                   | ed) 1   |
|  | Final Feder                          | al Financial                                       | Status Report - SF425                     | - 1   |
|  |                                      | ine Item 11  |   |   |
| Defense Technical Information  |                                      | ical Report W                                      | vith SF298<br>Mance Report (As Requir     | l l   |
| 8725 John J Kingman Road Ste<br>Fort Belvoir, VA 22060-6218  | 0944 Interim Res                     | earch reflora                                      | Marice Report (115 Medall                 | /   |
| Fort Belvoir, VA 22000-0210  |                                      |  |   |   |
|  |                                      |  | 77.000                                    |   |
| See block #26a   | Report of I                          | nventions and                                      | l Subcontracts - DD 882                   | 1   |
|  |                                      |  |   |   |
|  |                                      |  |   |   |
|  |                                      |  |   |   |
| Naval Research Laboratory  | Final Techr                          | nical Report                                       | Depost (As Bossis                         | red) 1  |
| ATTN: CODE 5596  | Interim Res                          | search Perform                                     | mance Report (As Requir                   | ,ea) I  |
| 4555 Overlook Avenue SW<br>Washington, DC 20375-5320   | with Brzyo                           |  |   |   |
| washingcom, DC 20375-5520  |                                      | <u></u>  |   |   |
| 32. FOR THE RECIPIENT  |                                      |  | ED STATES OF AMERICA                      |   |
| 32a, SIGNATURE OF PERSON AUTHORIZED T  | O SIGN                               |  | OF AWARDING OFFICER                       |   |
| N/A - SIGNATURE NOT REQUIF   | ED ON THIS AWARD                     | (b) (6)  |   |   |
| WATE SIGNATIONS HOTELS CON   |                                      |  |   |   |
| 32b, NAME AND TITLE OF SIGNER  | 32c, DATE SIGNED                     | 275.<br>276.                                       | TLE OF AWARD OFFICER                      | 33c, DATE SIGNED                                  |
|  |                                      | Ellen Simon  | noff                                      | 28-OCT-14   |

|   | NAVY INTERNAL | USĘ ONLY<br>REF DOC/ACRN                       | PR#15PR02066-00 FRC:4512 |             |             | for COMPTROLLER, ONR CONTRACT REVIEWED                       |
|---|---------------|--|--------------------------|-------------|-------------|--|
|   |               |  | 0                        | 00          | 00.         | FROLLER  |
| >   |               | AMOUNT<br>(CRITICAL)                           | \$97,558.00              | \$97,558.00 | \$97,558.00 | for COMP   |
| NAV   | T             | PDLJ<br>& SUF                                  |                          | PAGE TOTAL  | TOTAL.      |  |
| -   |               |  |                          | PAGE        | GRAND TOTAL |  |
| H e   |               | 8  |                          |             |             |  |
| DATA SHE<br>RNUMBER<br>15PR02066-00   | ×             | PROJ   | 000000                   |             |             |  |
| DA<br>4. PR NUM<br>1.5 PR   | _             | PAA  | 000000000                |             |             | RE   |
|   | r             | <u>,</u> =                                     | 3D                       |             |             | SIGNATU  |
| NOO   |               | n.<br>AAA<br>(CRITICAL)                        | 068342                   |             |             | COMPTROLLER APPROVAL: FOR FISCAL DATA AND SIGNATURE BY DATE- |
| ACC<br>SRITTICALL)  | ⊢             | . 5<br>5                                       | 0                        |             |             | ROLLER<br>FOR FISC<br>BY                                     |
| SIAL AC<br>S. MOD (CRITIC<br>PODDOG   | _             | . RFM  | ይ<br>4<br>0              |             |             | COMPTI   |
| ANG   | ۲             | PARM   | AS .                     |             |             |  |
|   | ⊢             | - G G G  |                          |             |             |  |
| EINANCIAL ACCOUNTING DATA SHEET - NAVY 3. MOD (CRITICAL) 1. SPRIN |               | C.<br>SUBHEAD<br>(CRITICAL)                    | MIAE                     |             |             |  |
|   |               | NOITA  | 1751319                  |             |             |  |
| 1. CONTRACT NUMBER (CRITICAL)<br>NO 0014-12-1-0229  | 6. UNE OF ACC | CLINISLIN A. B. APROPRIJ (CRITICAL) (CRITICAL) | ब्र                      |             |             | PREPARED/AUTORIZED BY:                                       |
| 1. CONTRACT   |               | CLIN/SLIN                                      |                          |             |             | PREPARED!  |

ONR AWARD FORM (10/99) - version 1.1

| AWARD NO.        | SPECIAL REQUIREMENTS | MODIFICATION NO.<br>P00006 |   |
|------------------|----------------------|----------------------------|---|
| N00014-12-1-0229 |                      | P00006                     |   |
| •                |                      |                            |   |
|                  |                      |                            |   |
|                  | •                    |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  | •                    |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
| ·                |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  | ,                    |                            |   |
|                  |                      |                            | 1 |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |
|                  |                      |                            |   |



3a. ISSUED BY: Office of Naval Research 495 Summer Street

|  | H                                  |                          | MODIF                                   | ICA  | TIO  | N                         | Bosto                   | e 627<br>on, MA 02210-21  | 09                    |                   |
|--|------------------------------------|--------------------------|---|--|--|---------------------------|-------------------------|---|-----------------------|-------------------|
|  |                                    |                          | 1. INSTRUMENT TYPE:                     |  |  | 31                        | b. CFD.                 |   |                       |                   |
| AVAL   | RESEARCY                           | -                        | Grant                                   |  |  |                           |                         | . 300<br>S NUMBER:  |                       |                   |
|  |                                    |                          | 2. AUTHORITY:                           | 21 1100                                      | 6304   | 3                         | u, DUN                  | O MONIBER.  |                       |                   |
| AVAIDE NO  |                                    |                          | 10 USC 2358,<br>5. MODIFICATION NO.:    | 6. MOI                                       | DIFICATION T   | YPE: 7                    | PR N                    |   |                       | <u> </u>          |
| . AWARD NO.:<br>N00014-12-1  | -0229                              |                          | A00001                                  | Adı  | min Mod  |                           | 141                     | PR00716-02  |                       | <u> </u>          |
| . ACTIVITY/AGENC   | Y PROPOSAL N                       | O.:                      | 9. RECIPIENT PROPOS                     |  | 10. PROPOS   |                           | : 11                    | I, ACTIVITY TYPE:   | 12, PROGR             | AM TYPE:          |
| N/A  |                                    |                          | N/A                                     | Tar sere                                     | 27-SEP   |                           | Dicte                   | RENT FROM BLOCK   | onr<br>13):           |                   |
| 3. ISSUED TO   | 13b. CAGE:                         |                          | EFT NUMBER:                             | 14. REM                                      | NTTANCE ADU<br>ne as blo   | ルスピング (IF<br>ごな #1つ       | - VIFFE                 | TACINI PROMI DECOR  | 10/1.                 |                   |
| 3a. ADDRESS: UNIVERSITY OFFICE OF G ADMINISTRAT 70 BUTTERFI AMHERST, MA  | RANT AND C<br>TON<br>ELD TERRAC    | CONTRACT<br>CE           | AMHERST                                 | Sall   | ic as nio  | OK #10                    | •                       |   |                       |                   |
| 3d. BUSINESS OFF   | ICE CONTACT:                       |                          |   | 1  |  |                           |                         |   |                       |                   |
| CAROL P.   |                                    |                          |   | -  |  |                           |                         |   |                       |                   |
| 3e. TELEPHONE N<br>(413) 54506   | 98 spra                            | MAIL ADDR<br>gue@resgs.v | mass.edu                                |  |  |                           |                         |   |                       | · <del>-</del> ·· |
|  |                                    | CRIPTION C<br>the Me     | OF PROJECT AND/OR PR<br>tallic-Like Cor | ROPOSAL T<br>aductiv                         | TITLE:<br>ity of M:  | icrobi                    | al N                    | anowires  |                       |                   |
| 16. FUNDING  |                                    | ACTIVITY/A               | GENCY SHARE RE                          | CIPIENT S                                    | HARE   |                           | T                       | OTAL 17. CURRENT  |                       | RIOD              |
| PREVIOUSLY OBLIG   |                                    |                          | 40,791.00                               |  | \$.00  | \$540                     | ,791                    | .00   | N/A<br>THROUGH<br>N/A |                   |
| OBLIGATED BY THIS  | S ACTION:                          |                          | \$.00                                   | :  | \$.00  |                           | \$                      | .00   |                       |                   |
| TOTAL OBLIGATED  | ON AWARD:                          | \$5                      | 40,791.00                               | •  | \$.00  | \$540                     | ,791                    | .00 18. PERIOD O  | 01-JAN-1              |                   |
| FUTURE FUNDING:  |                                    | \$                       | 97,558.00                               |  | \$.00  | \$97                      | ,558                    | 3.00  | THROUGH<br>31-DEC-1   |                   |
| GRÁNT TOTAL:   |                                    | \$6                      | 38,349.00                               |  | \$.00  | \$638                     | ,349                    | 0.00  |                       |                   |
| 19. ACCOUNTING A<br>See attache<br>20a. PRINCIPAL INV<br>TECHNICAL REPRE<br>DEREK R LOVI                       | d Financia<br>/ESTIGATOR/RE        | al Accou                 | nting Data Shee                         | 21. TEC<br>21a. NA<br>21c. AD<br>Offi<br>875 | CHNICAL REPI<br>ME: <u>Linda</u><br>DRESS:<br>ice of Na<br>North Ra<br>ington, V | A. Clarate Rendolph       | nrise<br>esean<br>n Str | rch<br>reet   | 21b. CODE:<br>ONR     | 342               |
|  |                                    |                          |   |  |  |                           |                         |   | DDDERO.               |                   |
| 20b, TELEPHONE N   | 1                                  | EMAIL ADD                |   |  | LEPHONE NU   |                           |                         | 21e. EMAIL A  |                       |                   |
| (413) 54596  |                                    |                          | oio.umass.edu                           |  | 3) 696-4!  |                           |                         | LINDA, CHRIS  | 23b. CODE:            |                   |
| 22. AWARDING OF  | FICE CONTACT                       | albu                     | 22b. CODE:                              | 23a. AE                                      | MINISTRATIV  | E UPPIUL                  | <b></b>                 |   | N628                  |                   |
| 22a. NAME: Vala<br>22c. ADDRESS:<br>Office of N:<br>495 Summer:<br>Suite 627<br>Boston, MA<br>22d. TELEPHONE N | aval Resea<br>Street<br>02210-2109 | irch                     | ONR BD244                               | 495<br>BOS'<br>PHO                           | REG BOST<br>SUMMER S<br>TON, MA (<br>NE: (617)<br>: (617)                        | STREET<br>02210-<br>0753- | ROO<br>2109<br>3283     | M 627   |                       |                   |
| (617) 753-4  | 776 VA                             | LARIE.WOODE              | BURY@NAVY.MIL                           |  |  |                           | 00                      | ATENT OFFICE  | 26b. CODE:            |                   |
| 24. SUBMIT PAYME   | ENT REQUEST                        | TO: 2                    | 5a, PAYING OFFICE:                      | 25b. CC                                      |  |                           | 26a. P                  | ATENT OFFICE:   | 260. CODE:            |                   |
| Same as blo  |                                    |                          | DFAS COLUMB. NO<br>COLUMBUS, OH 43      | RTH EN                                       | <u>Ю0337</u><br>ГЦ-НQ0337<br>66  | ,                         | ATTN<br>One<br>875      | ce of Naval Res<br>N: ONR BDCC<br>Liberty Center<br>North Randolph<br>Lngton, VA 2220 | search<br>Street, S   |                   |

|  | AMADD                                       | /MODIFIC                                 | ATION                      | MODIFICATION NO.                          |                         | İ    |
|--|---|--|----------------------------|---|-------------------------|------|
| WARD NO.<br>NOO014-12-1-0229   | AWARD                                       |  | JA HON                     | A00001                                    |                         |      |
| N00014-12-1-0225<br>27. SPECIAL INSTRUCTIONS:  |   |  |                            |   |                         |      |
| See "Special Requirements" Att   | cachment                                    |  |                            |   |                         | - 1  |
| pec phoeful and  |   |  |                            |   |                         | l    |
|  |   |  | 1.1. testing office (      | block 23a). Upon request the awarding     | office contact (block   | (22) |
| 28. DELEGATIONS: The administration duties listed  | below have been o                           | ielegated to the ad                      | ministrative office (      | o to the death (Pegional                  | -Contacts.aspx          |      |
| 28. DELEGATIONS: The authinistration duties libral will make their full text available. Please direct quest          | HOUSE TO THE COMME                          | http://ww                                | w.onr.navy.ml              | 1/Contracts-Grants/Regional               |                         |      |
| Full Delegation  |   |  |                            |   |                         | ı    |
| Full Belogation  |   |  |                            |   |                         |      |
|  |   |  |                            |   |                         | 1    |
|  |   |  |                            |   |                         | -    |
|  |   |  |                            |   |                         |      |
| 29. TERMS AND CONDITIONS: The following term   | e and conditions ar                         | e incorporated here                      | ein by reference wit       | h the same force and effect as if they w  | ere given in full text. | i.   |
| 29. TERMS AND CONDITIONS: The following term<br>Upon request the awarding office contact named in                    | block 22 will make                          | their full text availa                   | ble, or they can be        | found as described below.                 |                         |      |
| DOCUMENT   |   |  |                            |   |                         |      |
| The following documents may be for http://www.onr.navy.mil/Contracts   | und at:<br>-Grants/submi                    | t-proposal/g                             | rants-propos               | al/grants-terms-condition                 | s.aspx                  | - 1  |
|  |   |  |                            |   |                         | 1    |
| Standard Terms and Conditions for  | Research Gra                                | nts - June 2                             | 011 (Core)                 | ncv Specific)                             |                         | 1    |
| Standard Terms and Conditions for  | Research Gra                                | ints - reprud                            | 11, 2011 (119)             |   |                         |      |
| UACC Acceptance C<br>UAWA Award A  |   |  |                            |   |                         | 1    |
| UAWA AWAIC A   |   |  | •                          |   |                         | l    |
|  |   |  |                            |   |                         | j    |
|  |   |  |                            |   |                         | ļ    |
|  |   |  |                            | PERIOD                                    |                         |      |
| 30. OPTIONS OPTION NO.   |   | AMOUNT                                   |                            | Littop                                    |                         |      |
| (1)  |   |  |                            |   |                         |      |
| (2)  |   |  |                            |   |                         |      |
| (3)  |   |  |                            |   |                         |      |
| \( / A \)  | Tree to the landing                         | ad addresses in                          | the indicated quant        | ties, within 90 days following the expira | tion or termination o   | of . |
| 31. REPORTS: The following reports must be subthe project. Final Technical Reports must have a State of the project. | mitted to the indicat<br>SF298. Report Docu | mentation Page, a                        | ccompanying them           | Unless otherwise stated in the award/     | nodification, comple    | te   |
| the project. Final Technical Reports must have a Signor Block 12a of the SF298 as follows: "Approved for F           | Public Release; dist                        | ribution is Unlimite                     | d".                        |   | COPIE                   | ES   |
| ADDRESSEE  | RE  | PURTIFIE                                 |                            |   |                         |      |
|  | F:  | nal Technic                              | cal Report                 | with SF298                                | 1                       |      |
| See block #21  | Ir  | terim Rese                               | arch Perfor                | mance Report (As Requir                   | red)   1                |      |
|  |   | th SF298                                 |                            |   |                         |      |
|  |   |  |                            |   |                         |      |
|  |   |  |                            |   | 3 1                     |      |
| See block #23a   | Re  | eport of In                              | ventions an                | d Subcontracts - DD 882                   | 1 1                     |      |
| See DIOCK #23a   | F   | inal Techni                              | cal Report                 | mance Report (As Requir                   |                         |      |
| 1  | II  | nterim Rese                              | arch Perior<br>1 Pinancial | Status Report - SF425                     | - 1<br>1                |      |
|  | F   | inal redera                              | ne Item 11                 | Deacas III-                               | ŀ                       |      |
|  |   |  |                            |   | 1                       |      |
| Defense Technical Information  |   | lnal Techni                              | cal Report                 | with SF296<br>mance Report (As Requir     | red) 1                  |      |
| 19725 John J Kingman Road Ste  | 0944   14                                   | nterim Kese                              | arch Perior                | marice report (110 1104                   |                         |      |
| Fort Belvoir, VA 22060-6218  | W   | ith SF298                                |                            |   |                         |      |
|  |   |  |                            |   |                         |      |
|  |   | eport of In                              | ventions an                | d Subcontracts - DD 882                   | 2 1                     |      |
| See block #26a   | 1.5   | Sp010 01                                 |                            |   |                         |      |
|  |   |  |                            |   |                         |      |
|  |   |  |                            |   |                         |      |
|  | ł   |  |                            |   |                         |      |
| Naval Research Laboratory  | F   | inal Techni                              | cal Report                 | _ /= /=                                   | red) 1                  |      |
| Naval Research habotacory ATTN: CODE 5596  | I   | nterim Rese                              | earch Perfor               | mance Report (As Requi                    | reu/                    |      |
| 4555 Overlook Avenue SW  | w   | ith SF298                                |                            |   |                         |      |
| Washington, DC 20375-5320  |   |  |                            |   |                         |      |
|  |   | en e | as EOD THE LIM             | TED STATES OF AMERICA                     |                         |      |
| 32 FOR THE RECIPIENT   |   |  | 33. FUR THE UNI            | OF AWARDING OFFICER                       |                         |      |
| 32a. SIGNATURE OF PERSON AUTHORIZED  | FO SIGN                                     |  | (b) (6)                    |   |                         |      |
| N/A - SIGNATURE NOT REQUIF   |   | AWARD                                    | \-/\-/                     |   |                         |      |
| NIA = SIGNATURE NOT DE CON   |   |  |                            | <u> </u>                                  |                         | ·    |
|  | 1 30%                                       | DATE SIGNED                              | 33b. NAME AND              | TITLE OF AWARD OFFICER                    | 33c. DATE SI            |      |
| 32b. NAME AND TITLE OF SIGNER  |   |  |                            | Woodbury                                  | 28-JUL-14               | ±    |

|  | NAVY INTERNAL<br>USE ONLY<br>REF DOCACRN  |                                  | \$.00      | \$.00       | for COMPTROLLER, ONR CONTRACT REVIEWED                       |
|--|---|----------------------------------|------------|-------------|--|
|  | AMOUNT<br>(CRITICAL)  |                                  |            |             | for C  |
| FINANCIAL ACCOUNTING DATA SHEET - NAVY  L) 3. MOD (CRITICAL) 4. PR NUMBER  1.4 PRO 0716-02 | F. G. H. L. J. K. COST CODE  RFM SA AAA IT PAA PROJ PDLI UNIT MCC & SUF           | This page is intentionally blank | PAGE TOTAL | GRAND TOTAL | COMPTROLLER APPROVAL: FOR FISCAL DATA AND SIGNATURE BY DATE: |
| TINAN 1. CONTRACT NUMBER (CRITICAL) NODO14-12-1-0229                                       | CLINSLIN A. B. EPROPRIATION SUBHEAD OBJ PARM (CRITICAL) (CRITICAL) (CRITICAL) CLA | E                                |            |             | PREPARED/AUTORIZED BY:<br>DATE:                              |

ONR AWARD FORM (10/99) - version 1.1

ONR AWARD FORM (10/99) - version 1.1

| 1. CONTRACT NUMBER (CRITICAL) NO0014-12-1-0229 | 2. SPIIN (CRITICAL) | 3. MOD (CRITICAL) A00001 | 4. PR NUMBER<br>14PR00716-02   | a state of the sta |   |               |   |
|--|---------------------|--------------------------|--|--|---|---------------|---|
| 5. 6. ACRN 7. CLINISLIN (CRITICAL)             |                     | ACCOUNTING CITATION      | Account to the second s | æi   | AMOUNT<br>(CRITICAL)                    |               | NAVY INTERNAL<br>USE ONLY<br>REF DOC/ACRN |
|  | This                | page<br>1.8              | intentionally blank  | ank  |   |               |   |
|  |                     |                          |  | PAGE TOTAL   | \$.00                                   | 0             |   |
|  |                     |                          | GF.  | GRAND TOTAL  | \$.00                                   |               |   |
| PREPARED/AUTHORIZED BY: DATE:                  |                     |                          | COMPLINALEX APPROVAL: FOR FISCAL DATA AND SIGNATURE BY DATE:   | URE  | _for COMPTROLLER, ONR CONTRACT REVIEWED | R, ONR CONTRA | OT REVIEWED                               |
|  |                     |                          |  |  |   |               |   |

| AWARD NO.        | SPECIAL REQUIREMENTS | MODIF |
|------------------|----------------------|-------|
| N00014-12-1-0229 |                      | AUU   |

FICATION NO. 001

The purpose of this administrative modification is to: (A) change the payment office and (B) add instructions for numbering vouchers:

A. The payment office is hereby changed:

From: DFAS COLUMBUS NAVY ACQ 3990 E. BROAD STREET BLDG. 21 COLUMBUS, OH 43213 CODE HQ0251

To: DFAS-COLUMBUS CENTER NORTH ENTITLEMENT OPERATIONS P.O. BOX 182266 COLUMBUS, OH 43218-2266 CODE HQ0337

B. The following payment instructions are hereby added:

NUMBERING OF VOUCHERS SUBMITTED TO MOCAS PAYMENT OFFICES

Vouchers submitted to this payment office must be submitted using the following format:

- Voucher numbers must begin with BVN.
- Voucher number must be 7 characters
- The format must be BVNX###, where X = Alpha or Numeric character and # = Numeric character.

| OFF  | ICE OF   |                                       | AW/<br>MODIFI                              |                         | <del></del>   | N                          | 875 North                                  | Naval Rese<br>Randolph S<br>N. VA 22203-                           | Street              |         |
|--|--|---------------------------------------|--|-------------------------|---|----------------------------|--|--|---------------------|---------|
| WAY A  | RON  |                                       | 1. INSTRUMENT TYPE:<br>Grant               |                         |   |                            | 12.300                                     |  |                     |         |
|  | Hasa   |                                       | 2. AUTHORITY:                              | 1 110/1                 | 6204  |                            | 3c. DUNS NUN                               | /BER:  |                     |         |
| 4. AWARD NO.:  |  |                                       | 10 USC 2358, 33<br>5, MODIFICATION NO.:    | 6. MOD                  | DIFICATION T  | YPE:                       | 7. PR NO.:                                 |  |                     |         |
| N00014-12-1  | 0229   |                                       | P00005<br>9. RECIPIENT PROPOSAL            |                         | crement<br>10.PROPOS                                      | L LA                       | 14PR00                                     | 716-01<br>IVITY TYPE:  | 12. PROGRA          | M TYPE: |
| 8. ACTIVITY/AGENC  | Ÿ PROPOSAL N   | 10.:                                  | 9. RECIPIENT PROPOSAL                      |                         | 27-SEP  | -11                        | i i  |  | onr                 |         |
| 13, ISSUED TO<br>13a, ADDRESS:                             | 13b. CAGE:<br>1KVP4  | 13c, EDI/                             | EFT NUMBER:                                | 14. REMI                | ITTANCE ADI<br>ne as blo                                  | DRESS (I<br>nak #1         | JF DIFFERENT<br>13                         | FROM BLOCK 1   | (3):                |         |
| UNIVERSITY OFFICE OF G ADMINISTRAT 70 BUTTERFI AMHERST, MA | OF MASSACI<br>BRANT AND O<br>TION<br>ELD TERRA<br>A 01003-93 | CONTRACT<br>CE<br>33                  | AMHERST                                    |                         |   |                            |  |  |                     |         |
| 13d, BUSINESS OFF  |  | :                                     |  |                         |   |                            |  |  |                     |         |
| 13e, TELEPHONE N   | LIMBER: 13f  | EMAIL ADDR                            | ESS:                                       | 1                       |   |                            |  |  |                     |         |
| (413) 54506  | 98 spra  | ague@resgs.u                          | THE PERSON NAMED OF THE                    | T IASOS                 | TTI E-  |                            |  | <del></del>  |                     |         |
| 15. RESEARCH TITL<br>Mechanisms                            | E AND/OR DES<br>Underlyin                                    | g the Me                              | OF PROJECT AND/OR PRO<br>etallic-Like Cond | luctivi                 | ity of M  | icrob                      | ial Nanow                                  | ires   |                     |         |
|  |  |                                       |  |                         |   |                            |  | 17. CURRENT I  | ELINDING PER        | NOD     |
| 16. FUNDING  |  |                                       |  | CIPIENT SI              |   | ***                        |  |  | THROUGH             | 100     |
| PREVIOUSLY OBLIC   | SATED:   | \$40                                  | 01,348.10                                  |                         | \$.00   | •                          | 1,348.10                                   |  | THROUGH<br>I/A      |         |
| OBLIGATED BY THIS  | S ACTION:  | \$1                                   | 39,442.90                                  | ţ                       | \$.00   |                            | 9,442.90                                   |  |                     |         |
| TOTAL OBLIGATED  | ON AWARD:  | \$5                                   | 40,791.00                                  | ķ                       | \$.00   | \$54                       | 0,791.00                                   |  | 01-JAN-12           |         |
| FUTURE FUNDING:  | 1  | \$                                    | 97,558.00                                  | f                       | \$.00   | \$9                        | 7,558.00                                   |  | THROUGH             |         |
| GRANT TOTAL:   |  | \$6                                   | 38,349.00                                  | ;                       | \$.00   | \$63                       | 8,349.00                                   |  | 31-000              |         |
| 20a. PRINCIPAL INV   | d Financia   | al Accou                              | A:<br>unting Data Sheet                    | 21. TEC                 | HNICAL REPI   |                            |  |  | 21b. CODE:<br>ONR 3 | A 2     |
| TECHNICAL REPRE<br>DEREK R LOVI                            | ESENTATIVE:  |                                       |  | 21c, ADI<br>Offi<br>875 | ce of Na  | aval R<br>andolp           | Research<br>oh Street                      |  |                     | ±2      |
| 20b, TELEPHONE N   | NUMBER: 20c  | . EMAIL ADD                           | RESS:                                      | 21d. TELEPHONE NUMBER:  |   |                            | 21e. EMAIL ADDRESS: LINDA.CHRISEY@NAVY.MIL |  |                     |         |
| (413) 54596  | 651 die  |                                       | bio.umass.edu                              | (703                    | 3) 696-4  | 504                        | <u></u>                                    | LINDA, CHRISE  | 23b. CODE:          |         |
| 22. AWARDING OF  |  |                                       | 22b. CODE:<br>ONR BD255                    | 23a. ADI                | MINISTRATIV   | /E OFFIC                   | JE:  |  | N628                | 79      |
| 22d. ADDRESS: Office of No. 875 North R. Arlington,        | aval Resea<br>andolph St<br>VA 22203-1<br>NUMBER: 22e        | arch<br>treet<br>1995<br>e. EMAIL ADD | DRESS:                                     | 495<br>BOST<br>PHON     | REG BOST<br>SUMMER S<br>FON, MA (<br>NE: (617)<br>: (617) | STREET<br>02210-<br>) 753- | T ROOM 62<br>-2109<br>-3283                | 7  |                     |         |
| (703) 696-2<br>24. SUBMIT PAYME                            | 45/0   | LIZABETH, FOR                         | 5a. PAYING OFFICE:                         | 25b, CO                 | DDE:  |                            | 26a. PATEN                                 | T OFFICE:  | 26b, CODE;          |         |
| Same as blo  |  |                                       | DFAS CLEVELAND N<br>CLEVELAND, OH 44       | H<br>QH-YVAI            | 00251<br>00251  |                            | ATTN: ON<br>One Libe<br>875 Nort           | of Naval Res<br>R BDCC<br>rty Center<br>h Randolph<br>on, VA 22203 | Street, Su          |         |

|   | ANNADOMODIE                            | HOATION  | MODIFICATION NO.   |                          |  |  |  |
|---|--|--|--|--------------------------|--|--|--|
| AWARD NO.<br>N00014-12-1-0229   | AWARD/MODIF                            | TOATION  | P00005   |                          |  |  |  |
| 27. SPECIAL INSTRUCTIONS:   |  |  |  |                          |  |  |  |
| See "Special Requirements" Att  | achment                                |  |  |                          |  |  |  |
|   |  |  |  |                          |  |  |  |
| 28. DELEGATIONS: The administration duties listed   | below have been delegated to the       | administrative office (                          | plock 23a). Upon request the awarding o                                | ffice contact (block 22) |  |  |  |
| will make their full text available. Please direct questi   | ions to the contacts @: http://        | www.onr.navy.mi                                  | l/Contracts-Grants/Regional-   | Contacts.aspx            |  |  |  |
| Full Delegation   |  |  |  |                          |  |  |  |
| Full Delegation   |  |  |  |                          |  |  |  |
|   |  |  |  |                          |  |  |  |
|   |  |  |  |                          |  |  |  |
|   |  |  |  |                          |  |  |  |
| 29. TERMS AND CONDITIONS: The following terms   | s and conditions are incorporated h    | nerein by reference wit                          | h the same force and effect as it they we<br>found as described below. | re given in tua text.    |  |  |  |
| Upon request the awarding office contact named in a   | block 22 will make their full text ava | anable, of they can be                           |  |                          |  |  |  |
| DOCUMENT The following documents may be fou   | and at:                                | /example_propos                                  | al/grants-terms-conditions   | .aspx                    |  |  |  |
| http://www.onr.navy.mil/Contracts-  | Grants/submit-proposar                 |  | 1/9141105 5511115 5511115  | •                        |  |  |  |
| Standard Terms and Conditions for   | Research Grants - June                 | 2011 (Core)                                      | nav Specific)  |                          |  |  |  |
| Standard Terms and Conditions for<br>Standard Terms and Conditions for<br>UAAC UACC Acceptance C November   | Research Grants - Febr                 | ualy Zuli (age                                   | no, ppedage,   |                          |  |  |  |
| UAMA UAWA Award A   |  |  |  |                          |  |  |  |
| <b></b>   |  |  |  |                          |  |  |  |
|   |  |  |  |                          |  |  |  |
|   |  |  |  |                          |  |  |  |
| 30, OPTIONS OPTION NO.  | AMOUNT                                 |  | PERIOD   |                          |  |  |  |
| (1)   |  |  |  |                          |  |  |  |
| (2)   |  |  |  |                          |  |  |  |
| (3)   |  |  |  |                          |  |  |  |
| (4) 31. REPORTS: The following reports must be subm   | litted to the indicated addressees, i  | in the indicated quanti                          | les, within 90 days following the expirati                             | on or termination of     |  |  |  |
| 31. REPORTS: The following reports must be subm<br>the project. Final Technical Reports must have a SF<br>Block 12a of the SF298 as follows: "Approved for Pr |  |  | Unless otherwise stated in the award/in                                | Samoanon, Compress       |  |  |  |
|   | REPORT TYPE                            |  |  | COPIES                   |  |  |  |
| ADDRESSEE   | Final Techn                            | ical Report w                                    | rith SF298   | 1                        |  |  |  |
| See block #21   | Interim Res                            | earch Perform                                    | mance Report (As Require   | ed) 1                    |  |  |  |
|   | with SF298                             |  |  |                          |  |  |  |
|   |  |  |  |                          |  |  |  |
|   | Poport of T                            | nventions and                                    | Subcontracts - DD 882  | 1                        |  |  |  |
| See block #23a  | Final Techn                            | vical Report                                     |  | 1                        |  |  |  |
|   | Interim Res                            | search Perform                                   | mance Report (As Require<br>Status Report - SF425                      | ed)   1<br>-             |  |  |  |
|   |  | ine Item 11                                      | Status Report 51 125   | -                        |  |  |  |
|   |  | ical Report v                                    | iirh SE298   | 1                        |  |  |  |
| Defense Technical Information   |  | earch Perform                                    | nance Report (As Require   | ed) 1                    |  |  |  |
| 8725 John J Kingman Road Ste<br>Fort Belvoir, VA 22060-6218   | with SF298                             |  |  |                          |  |  |  |
| FOLC BOLVOLLY VII == 1  |  |  |  | ]                        |  |  |  |
|   | Banart of I                            | Report of Inventions and Subcontracts - DD 882 1 |  |                          |  |  |  |
| See block #26a  | Report Or 1                            | CIIV CII CII CII CII                             |  |                          |  |  |  |
|   |  |  |  |                          |  |  |  |
|   |  |  |  |                          |  |  |  |
|   | Binal Wash                             | nical Report                                     | <u> </u>   | 1.                       |  |  |  |
| Naval Research Laboratory   | Interim Res                            | search Perfor                                    | mance Report (As Requir  | ed) 1                    |  |  |  |
| ATTN: CODE 5596<br>4555 Overlook Avenue SW  | with SF298                             |  |  |                          |  |  |  |
| Washington, DC 20375-5320   |  |  |  |                          |  |  |  |
|   |  | 33. FOR THE UNIT                                 | ED STATES OF AMERICA   |                          |  |  |  |
| 32. FOR THE RECIPIENT 328. SIGNATURE OF PERSON AUTHORIZED TO  | DISIGN                                 | 33a SIGNATURE                                    | OF AWARDING OFFICER  |                          |  |  |  |
|   |  | (b) (6)  |  |                          |  |  |  |
| N/A - SIGNATURE NOT REQUIRE   | ED ON THIS AWARD                       |  |  |                          |  |  |  |
|   | 32c DATE SIGNED                        | 33b, NAME AND T                                  | TLE OF AWARD OFFICER   | 33c. DATE SIGNED         |  |  |  |
| 32b. NAME AND TITLE OF SIGNER   | JZS DAILOIGHED                         | Ellen Simo                                       |  | 20-MAR-14                |  |  |  |

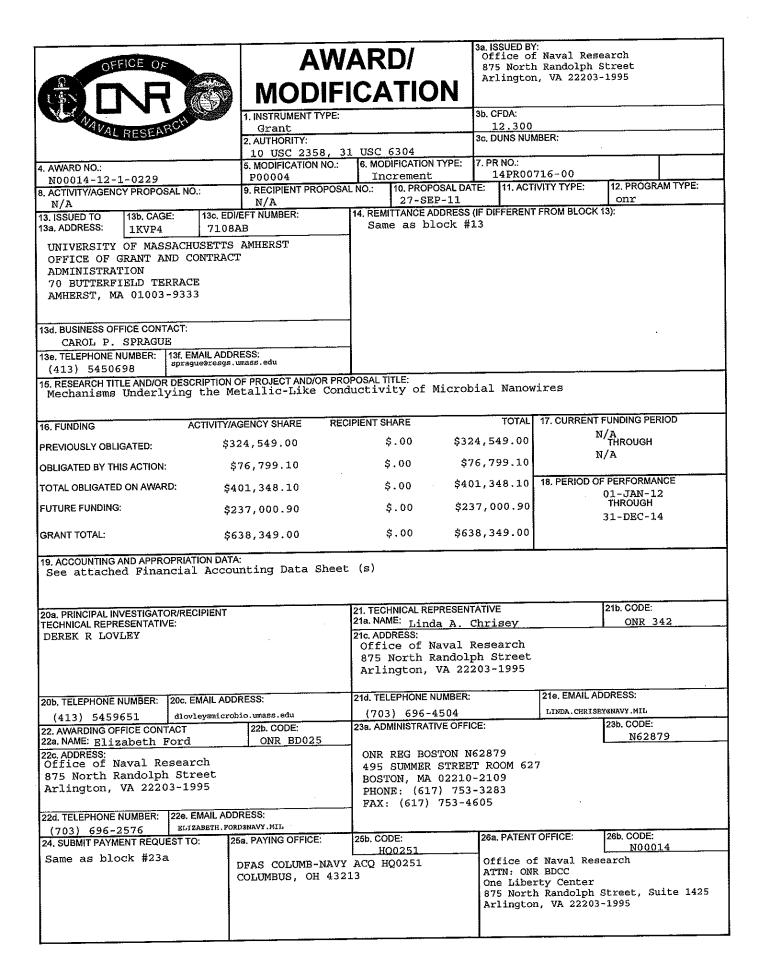
|   | NAVY INTERNAL<br>USE ONLY<br>REF DOCAGRN           | PR#14PR00716-01 FRC:4512 |              | for COMPTROLLER, ONR CONTRACT REVIEWED                                |
|---|--|--------------------------|--------------|---|
|   | AMOUNT<br>(CRITICAL)                               | \$139,442.90             | \$139,442.90 | for COMPTROLLE  |
| ET - NAV  | COST CODE PROJ PDJ UNIT MCC & SUF                  | 000                      | PAGE TOTAL   | GRAND TOTAL   |
| INTING DATA SHE                                   | IT PAA   | 2D 0000000               |              | VAL:<br>A AND SIGNATURE   |
| CIAL ACCOU  | F. G. H. AAA (CRITICAL)                            | 349 0 068342             |              | COMPTROLLER APPROVAL:<br>FOR FISCAL DATA AND SIGNATURE<br>BY<br>DATE: |
| FINAN 2. SPIIN (CRITICAL)                         | C. SUBHEAD OBJ PARM (CRITICAL) CLA                 | WIRE 410 RA              |              |   |
|   | CLINSLIN A. B. APPROPRIATION ACRITICAL) (CRITICAL) | AD 1741319               |              | ORIZED BY:  |
| 1. CONTRACT NUMBER (CRITICAL)<br>N00014-12-1-0229 | CLIN/SLIN A. AC                                    |                          |              | PREPARED/AUTORIZED BY:  |

ONR AWARD FORM (10/99) - version 1.1

|  | NAVY INTERNAL USE ONLY REF DOC/ACRN |                                  |            | NITRACT REVIEWED   |
|--|-------------------------------------|----------------------------------|------------|--|
| American Ame | AMOUNT<br>(CRITICAL)                |                                  | 00.W       | for COMPTROLLER, ONR CONTRACT REVIEWED                       |
| 3. MOD (CRITICAL) 4. PR NUMBER<br>P00005 14PR00716-01  | ATTON                               | This page is intentionally blank | PAGE TOTAL | COMPTROLLER APPROVAL: FOR FISCAL DATA AND SIGNATURE BY DATE: |
| 1. CONTRACT NUMBER (CRITICAL) 2. SPIIN (CRITICAL)  | S. CLINSLIN (CRITICAL)              |                                  |            | PREPAREDIAUTHORIZED BY:<br>DATE:                             |

ONR AWARD FORM (10/99) - version 1.1

| AWARD NO.        | SPECIAL REQUIREMENTS | MODIFICATION NO. P00005 |  |
|------------------|----------------------|-------------------------|--|
| N00014-12-1-0229 |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  | •                    |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  | •                    |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  | •                    |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |
|                  |                      |                         |  |



|  | 41944  | DAIODIEIC  | NATION                                      | MODIFICATION NO.                                    |  |  |  |
|--|--|--|---|---|--|--|--|
| AWARD NO.<br>NO 0014-12-1-0229   | AWAR   | D/MODIFIC  | AHON  | P00004  |  |  |  |
| 27 SPECIAL INSTRUCTIONS:   |  |  |   |   | Ì  |  |  |
| See "Special Requirements"   | Attachment                                       |  |   |   | -  |  |  |
|  |  |  |   |   |  |  |  |
| 28. DELEGATIONS: The administration duties   | isted below have be                              | en delegated to the ad                             | ministrative office (                       | block 23a). Upon request the awarding o             | ffice contact (block 22)                   |  |  |
| will make their full text available. Please direct o   | uestions to the cont                             | acts @: http://ww                                  | w.onr.navy.mi                               | l/Contracts-Grants/Regional-                        | Contacts.aspx                              |  |  |
| Full Delegation  |  |  |   |   | 1  |  |  |
| Edil Belogation  |  |  |   |   | ļ  |  |  |
|  |  |  |   |   |  |  |  |
|  |  |  |   |   |  |  |  |
|  |  |  |   | We are force and effect as if they we               | re given in full text.                     |  |  |
| 29. TERMS AND CONDITIONS: The following Upon request the awarding office contact name  | terms and conditions                             | s are incorporated here                            | ein by reference wit<br>ble, or they can be | found as described below.                           |  |  |  |
| DOCUMENT   |  |  |   |   |  |  |  |
| The following documents may be http://www.onr.navy.mil/Contraction   | found at:  | hmit-proposal/q                                    | rants-propos                                | al/grants-terms-conditions                          | .aspx                                      |  |  |
| http://www.onr.navy.mil/Contrac  | ce-Granes/su                                     | Ouric proposition, 5                               |   |   |  |  |  |
| Standard Terms and Conditions:<br>Standard Terms and Conditions:   | for Research (                                   | Grants - June 2<br>Grants - Februa                 | 011 (Core)<br>rv 2011 (Age                  | ncy Specific)                                       |  |  |  |
| Standard Terms and Conditions :<br>UAAC UACC Acceptance C November   | cor Research (                                   | Granco 100-00                                      |   | •   |  |  |  |
| UAWA UAWA Award A  |  |  |   |   |  |  |  |
|  |  |  |   |   | :  |  |  |
|  |  |  |   |   |  |  |  |
|  |  |  |   | PERIOD  | <u> </u>                                   |  |  |
| 30, OPTIONS OPTION NO.   |  | AMOUNT   |   | PERIOD  |  |  |  |
| (1)  |  |  |   |   |  |  |  |
| (2)  |  |  |   |   |  |  |  |
| (3)  |  |  |   |   | d division of                              |  |  |
| (4)<br>31. REPORTS: The following reports must be  | submitted to the ind                             | icated addressees, in t                            | he indicated quanti                         | ties, within 90 days following the expirate         | on or termination of odification, complete |  |  |
| 31. REPORTS: The following reports must be<br>the project. Final Technical Reports must have<br>Block 12a of the SF298 as follows: "Approved | e a SF298, Report D<br>for Public Release;       | ocumentation Page, ac<br>distribution is Unlimited | жопранунід віст.<br>1°.                     | 018000 081011100                                    |  |  |  |
| ADDRESSEE  | 10,7,42,10                                       | REPORT TYPE  |   |   | COPIES                                     |  |  |
|  |  | Final Technic                                      | al Report v                                 | vith SF298  | 1  |  |  |
| See block #21  |  | Interim Resea                                      | arch Perform                                | mance Report (As Require                            | ed)   1                                    |  |  |
|  |  | with SF298   |   |   |  |  |  |
|  |  |  | •   |   |  |  |  |
|  |  | Peport of Inv                                      | ventions and                                | d Subcontracts - DD 882                             | 1  |  |  |
| See block #23a   |  | minol Tochnic                                      | al Report                                   |   | 1  |  |  |
| ļ  |  | Interim Resea                                      | arch Perfor                                 | mance Report (As Require<br>Status Report - SF425 - | ed)   1<br>-   1                           |  |  |
|  |  | Final Federa.<br>Including Li                      | ne Item 11                                  | ocacus report                                       |  |  |  |
|  |  | Ti1 Weebnie  | aal Penort 1                                | with SF298  | 1  |  |  |
| Defense Technical Informat   | ion Center                                       | Interim Resea                                      | arch Perfor                                 | mance Report (As Require                            | ed) 1                                      |  |  |
| 8725 John J Kingman Road S<br>Fort Belvoir, VA 22060-621   | 8  | with SF298   |   |   |  |  |  |
| Fore Beavear,  |  |  |   |   |  |  |  |
|  | Report of Inventions and Subcontracts - DD 882 1 |  |   |   |  |  |  |
| See block #26a   |  | Kepore or 111                                      |   | •   |  |  |  |
|  |  |  |   |   |  |  |  |
|  |  | ]  |   |   |  |  |  |
|  |  | Final Techni                                       | cal Report                                  |   | 1  |  |  |
| Naval Research Laboratory  |  | Interim Rese                                       | arch Perfor                                 | mance Report (As Requir                             | ed) 1                                      |  |  |
| ATTN: CODE 5596<br>4555 Overlook Avenue SW   |  | with SF298   |   |   |  |  |  |
| Washington, DC 20375-5320  |  |  |   |   |  |  |  |
|  |  |  | 33. FOR THE UNI                             | TED STATES OF AMERICA                               |  |  |  |
| 32. FOR THE RECIPIENT 32a. SIGNATURE OF PERSON AUTHORIZ  | ED TØ SIGN                                       |  | 33a, SIGNATURE                              | OF AWARDING OFFICER                                 |  |  |  |
|  |  | O AVAIADD  | (b) (6)                                     |   |  |  |  |
| N/A - SIGNATURE NOT REQ  | UIRED ON THI                                     | S-AWARU  |   |   |  |  |  |
|  | <del> </del>                                     | 32c. DATE SIGNED                                   | 33b. NAME AND T                             | TITLE OF AWARD OFFICER                              | 33c. DATE SIGNED                           |  |  |
| 32b. NAME AND TITLE OF SIGNER  |  |  | Ellen Simo                                  |   | 12-NOV-13                                  |  |  |

|  | MAVY INTERNAL    | REF DOCACRN  | PR#14PR00716-00 FRC:415B PR#14PR00716-00 FRC:415B |             |             | for COMPTROLLER, ONR CONTRACT REVIEWED                                |
|--|------------------|--|---|-------------|-------------|---|
|  | ENICA            | (CRITICAL)   | \$31,845.26                                       | \$76,799.10 | \$76,799.10 | for COMPTROLL   |
| FINANCIAL ACCOUNTING DATA SHEET - NAVY  13 MOD (CRITICAL) 4 PR NUMBER  14 PRO0716-00 | G. H. I. K.      | AAA<br>RITICAL)                                      | 000   | PAGE TOTAL  | GRAND TOTAL | COMPTROLLER APPROVAL:<br>FOR FISCAL DATA AND SIGNATURE<br>BY<br>DATE: |
| 2. SPIIN (CRITICA  | UNITING C. D. E. | APPROPRIATION SUBHEAD OBJ PARM (CRITICAL) (CRITICAL) | 1741319 WIAE 410 RA<br>1741319 WIAE 410 RA        |             |             | 97:   |
| 1. CONTRACT NUMBER (CRITICAL)  | CLINSLIN A.      | ACRN<br>(CRITICAL)                                   | A A C   |             |             | PREPARED/AUTORIZED BY:  |

ONR AWARD FORM (10/99) - version 1.1

ONR AWARD FORM (10/99) - version 1.1

| 1. CONTRACT NUMBER (CRI<br>NO 0 0 1 4 - 1 2 - 1 - 0 2 2 9 | CONTRACT NUMBER (CRITICAL) | 2 SPIIN (CRITICAL)   | 3. MOD (CRITICAL)<br>P00004 | 4. PR NUMBER<br>14 PR00716-00                          | •                           |  | 1.000                                     |
|---|----------------------------|--|-----------------------------|--|-----------------------------|--|---|
| 5. 6. CLIN/SLIN AC  | 6. ACRN 7. (CRITICAL)      |  | ACCOUNTING CITATION         |  | 8. AMOUNT<br>(CRITICAL)     | UNT<br>ICAL)                           | NAVY INTERNAL<br>USE ONLY<br>REF DOC/ACRN |
|   |                            | This   | page<br>1.s                 | intentionally blank                                    | nk                          |  |   |
|   |                            | The state of the s |                             | ć. 725   | PAGE TOTAL  <br>GRAND TOTAL | \$.00                                  |   |
| PREPARED/AUTHORIZED BY: DATE:                             | НОRIZED ВҮ:                |  |                             | COMPTROILER APPROVAL: FOR FISCAL DATA AND SIGNATURE BY |                             | for COMPTROLLER, ONR CONTRACT REVIEWED | TRACT REVIEWED                            |

| AWARD NO.        | SPECIAL REQUIREMENTS | MODIFICATION NO. P00004 |     |
|------------------|----------------------|-------------------------|-----|
| N00014-12-1-0229 |                      | P00004                  | 1   |
|                  |                      | •                       |     |
| •                |                      |                         |     |
|                  |                      |                         |     |
| ·                |                      | •                       |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      | •                       |     |
|                  | 1                    |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
| ·                |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         | 1   |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         | 1   |
|                  |                      |                         |     |
|                  |                      |                         | - 1 |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
| ·                |                      |                         |     |
|                  |                      |                         |     |
|                  |                      |                         |     |
| ·                |                      |                         |     |

| OFFICE OF  | MODIF  | IARD/   | 3a ISSUED BY:<br>Office of Nav<br>875 North Rar<br>Arlington, VA | ndolph Street                 |
|--|--|---|--|-------------------------------|
|  | 1. INSTRUMENT TYPE:                                  |   | 3b. CFDA:<br>12.300  |                               |
| AL RESEARC   | Grant<br>2. AUTHORITY:                               |   | 3c, DUNS NUMBER:   |                               |
|  | 10 USC 2358,   | 31 USC 6304   | 7 20 10 1  |                               |
| 4. AWARD NO.:  | 5. MODIFICATION NO.:<br>P00003                       | 6. MODIFICATION TYPE:<br>Increment  | 7. PR NO.:<br>13PR02204~   | 01                            |
| N00014-12-1-0229<br>8. ACTIVITY/AGENCY PROPOSAL NO.:   | 9. RECIPIENT PROPOS                                  | AL NO.: 10. PROPOSAL D  | ATE: 11. ACTIVITY  | 1                             |
| N/A  | N/A  | 27-SEP-11<br>14. REMITTANCE ADDRES  | C (IC DIECEDENT EROI   | onr<br>M RI OCK 13)           |
| 13. ISSUED TO 13b, CAGE: 13a. ADDRESS: 1.KVP4  | 13c. EDI/EFT NUMBER:<br>71.08AB                      | Same as block   | \$ (IF DIFFERENT FROM<br>#13                                     | W BEOOK 19).                  |
| UNIVERSITY OF MASSACHUS OFFICE OF GRANT AND CON ADMINISTRATION 70 BUTTERFIELD TERRACE AMHERST, MA 01003-9333                       | HETTS AMHERST<br>HTRACT                              |   |  |                               |
| CAROL P. SPRAGUE   |  |   |  | :                             |
| 100: 1222: 1121  | NL ADDRESS:  |   |  |                               |
| (413) 5450698  |  | ROPOSAL TITLE:  |  |                               |
| 15. RESEARCH TITLE AND/OR DESCR<br>Mechanisms Underlying t   | the Metallic-Like Cor                                | nductivity of Micro   | obial Nanowire   | 8                             |
|  |  |   | TOTAL 17. C  | CURRENT FUNDING PERIOD        |
| 16. FUNDING AC   | TIVITY/AGENCY SHARE RE                               | ECIPIENT SHARE  |  |                               |
| PREVIOUSLY OBLIGATED:  | \$269,577.00   | \$.00 \$2   | 269,577.00   | N/A<br>THROUGH<br>N/A         |
| OBLIGATED BY THIS ACTION:  | \$54,972.00  | \$.00   | \$54,972.00  | N/ A                          |
| TOTAL OBLIGATED ON AWARD:  | \$324,549.00   | \$.00 \$3   | 324,549.00 18.1  | PERIOD OF PERFORMANCE         |
|  | •  | •   | 313,800.00   | 01-JAN-12<br>THROUGH          |
| FUTURE FUNDING:  | \$313,800.00   | \$.00 \$  | 313,000.00   | 31-DEC-14                     |
| GRANT TOTAL:   | \$638,349.00   | \$.00 \$  | 638,349.00   |                               |
| 19. ACCOUNTING AND APPROPRIATION See attached Financial  20a. PRINCIPAL INVESTIGATOR/RECITECHNICAL REPRESENTATIVE:  DEREK R LOVLEY | Accounting Data Shee                                 | 21. TECHNICAL REPRESE 21a. NAME: Linda A. 21c. ADDRESS: Office of Naval 875 North Rando Arlington, VA 2 | Chrisey<br>Research<br>lph Street                                | 21b. CODE:<br>ONR 342         |
| 20b. TELEPHONE NUMBER: 20c. EM   | AIL ADDRESS:   | 21d. TELEPHONE NUMBE  |  | EMAIL ADDRESS:                |
|  | yemicrobio.umass.edu                                 | (703) 696-4504  |  | RISBLEONR.NAVY.MIL 23b. CODE: |
| 22. AWARDING OFFICE CONTACT  | 22b. CODE:   | 23a. ADMINISTRATIVE OF  | FICE:  | N62879                        |
| 22a. NAME: Elizabeth Ford 22c. ADDRESS:  | ONR BD025  | ONR REG BOSTON  | N62879   |                               |
| Office of Naval Research<br>875 North Randolph Stre<br>Arlington, VA 22203-199   | eet  | 495 SUMMER STRE<br>BOSTON, MA 0223<br>PHONE: (617) 75<br>FAX: (617) 753-                                | EET ROOM 627<br>LO-2109<br>53-3283                               |                               |
| (703) 696-2576 FORDE   | OONR.NAVY.MIL  | ash CODE:   | 26a, PATENT OFF  | ICE: 26b, CODE:               |
| 24. SUBMIT PAYMENT REQUEST TO:<br>Same as block #23a   | 25a. PAYING OFFICE:  DFAS COLUMB-NAV COLUMBUS, OH 43 |   | Office of Na ATTN: ONR BD One Liberty 875 North Ra               | N00014<br>Lival Research      |

|  | A \A \A \D                                | D/MODIFI  | CATION  | MODIFICATION NO.                         |                               |
|--|---|---|---|--|-------------------------------|
| AWARD NO.<br>NO 0014-12-1-0229   | AWAR                                      | DINIODILI                                       | CATION  | P00003                                   |                               |
| 27. SPECIAL INSTRUCTIONS:<br>See "Special Requirements" A  | ttachment                                 |   |   |  |                               |
| See "Special Requirements :-   |   |   |   |  |                               |
| 28. DELEGATIONS: The administration duties list  | ted below have bee                        | en delegated to the a                           | dministrative office (                        | block 23a). Upon request the awardin     | g office contact (block 22)   |
| will make their full text available. Please direct que   | estions to the conta                      | acts @: http://w                                | ww.onr.navy.mi                                | l/Contracts-Grants/Regiona               | 1-Contacts.aspx               |
| Full Delegation  |   |   |   |  | Ì                             |
|  |   |   |   |  |                               |
|  |   |   |   |  |                               |
|  |   |   |   | h the same farce and effect as if they   | were given in full text.      |
| 29. TERMS AND CONDITIONS: The following ter<br>Upon request the awarding office contact named  | rms and conditions<br>in block 22 will ma | are incorporated he<br>ke their full text avail | rein by reference wit<br>able, or they can be | found as described below.                | Trois given in the contract   |
| DOCUMENT   |   |   | ·····   |  |                               |
| The following documents may be f<br>http://www.onr.navy.mil/Contract   | s-Grants/sub                              | omit-proposal/                                  | grants-propos                                 | al/grants-terms-condition                | ns.aspx                       |
| UAAC Acceptance C November 2003  |   |   |   |  | •                             |
| Agency Specific February 2011<br>UAWA Award A November 2003  |   |   |   |  |                               |
| Core June 2011   |   |   |   |  |                               |
|  |   |   |   |  |                               |
|  |   |   |   |  |                               |
| 30, OPTIONS OPTION NO.   |   | AMOUNT  |   | PERIOD                                   |                               |
| (1)  |   |   |   |  |                               |
| (2)<br>(3)   |   |   |   |  |                               |
| (4)  | hmitted to the indi                       | cated addressees, in                            | the indicated quanti                          | ties, within 90 days following the expir | ation or termination of       |
| 31. REPORTS: The following reports must be su<br>the project. Final Technical Reports must have a<br>Block 12a of the SF298 as follows: "Approved fo |   |   |   | Unless otherwise stated in the award     | /modification, complete       |
| ADDRESSEE  | - Tubilo Troisday                         | REPORT TYPE                                     |   |  | COPIES                        |
| See block #21  |   | Final Techni                                    | cal Report w                                  | vith SF298                               | red) 1                        |
| Dec Broom N-1  |   | Interim Rese<br>with SF298                      | arch Perior                                   | mance Report (As Requi                   | 2007                          |
|  |   |   |   |  |                               |
|  |   | Report of In                                    | ventions and                                  | d Subcontracts - DD 88                   | 2 1                           |
| See block #23a   |   | Winel Techni                                    | cal Report                                    | mance Report (As Requi                   | 1                             |
|  |   | Final Federa                                    | l Financial                                   | Status Report - SF425                    | - 1                           |
|  |   | Including Li                                    | ne Item 11                                    |  | 1                             |
| Defense Technical Information  |   | Final Techni                                    | cal Report V<br>arch Perform                  | vith SF298<br>Mance Report (As Requi     |                               |
| 8725 John J Kingman Road Ste<br>Fort Belvoir, VA 22060-6218  | e 0944                                    | with SF298                                      | 2   | •  |                               |
|  |   |   |   |  |                               |
| See block #26a   |   | Report of In                                    | ventions and                                  | l Subcontracts - DD 88                   | 2 1                           |
|  |   |   |   |  |                               |
|  |   |   |   |  |                               |
|  |   | Final Techni                                    | ical Report                                   |  | 1                             |
| Naval Research Laboratory<br>ATTN: CODE 5596   |   | Interim Rese                                    | earch Perfor                                  | mance Report (As Requi                   | ired) 1                       |
| 4555 Overlook Avenue SW  |   | with SF298                                      |   |  |                               |
| Washington, DC 20375-5320  |   |   |   | ED STATES OF AMERICA                     |                               |
| 32. FOR THE RECIPIENT  | TO SIGN                                   |   | 33. FOR THE UNIT                              | ED STATES OF AMERICA OF AWARDING OFFICER |                               |
| 32a. SIGNATURE OF PERSON AUTHORIZED  |   | S AVAVA P.D.                                    | (b) (6)                                       |  |                               |
| N/A - SIGNATURE NOT REQU   | IKEU UN I FIIS                            | YAYARU  |   | <u> </u>                                 |                               |
| 326 NAME AND TITLE OF SIGNER   | 3   | 2c. DATE SIGNED                                 |   | ITLE OF AWARD OFFICER                    | 33c, DATE SIGNED<br>03-JUN-13 |
|  |   |   | Ellen Simo                                    | norr                                     | 100 000 10                    |

| EINANCIAL ACCOUNTING DATA SHEET - INAVI  2. SPIIN (CRITICAL) 3. MOD (CRITICAL) 1.3 PRO 0.2 2 0.4 - 0.1 | AMOUNT<br>(CRITICAL)                            | 000                                     | PAGE TOTAL \$54,972.00 | GRAND TOTAL \$54,972.00 | COMPTROLLER APPROVAL: FOR FISCAL DATA AND SIGNATURE FOR FISCAL DAT |           |
|--|---|---|------------------------|-------------------------|--|-----------|
| SIAL AC<br>3. MOD (CRITICA<br>PODODO3  | F. G. SA  | 0 · · · · · · · · · · · · · · · · · · · |                        |                         | COMPTROU   | DATE: BY_ |
| FINAN  | D. E.<br>OBJ PARM<br>CLA                        | 410<br>RB                               |                        |                         |  |           |
| 2. SPIIN (CRITICA  | C.<br>SUBHEAD<br>(CRITICAL)                     | WIAE                                    |                        |                         |  |           |
|  | SATION<br>(L)                                   | 1731319                                 |                        |                         |  |           |
| 1. CONTRACT NUMBER (CRITICAL)<br>NO 0014-12-1-0229   | CLINSLIN A. B. APPROPI<br>(CRITICAL) (CRITICAL) | AB.                                     |                        |                         | PREPARED/AUTORIZED BY:   |           |
| CONTRACT!  | CLIN/SLIN                                       |   |                        |                         | PREPARED   |           |

| I I Valuation I I I I I I I I I I I I I I I I I I I               | NAVY BYTERNAL<br>USE ONLY<br>REF DOC/ACRN |                                  |             | for COMPTROLLER, ONR CONTRACT REVIEWED                 |
|---|---|----------------------------------|-------------|--|
|   | AMOUNT<br>(CRITICAL)                      |                                  | \$.00       | for COMPTROLLER, ON                                    |
| 2. SPIIN (CRITICAL) 3. MOD (CRITICAL) 4. PR NUMBER 1.3 PR02204-01 | 8. ACCOUNTING CITATION                    | This page is intentionally blank | GRAND TOTAL | COMPTROLLER APPROVAL: FOR FISCAL DATA AND SIGNATURE BY |
| 1. CONTRACT NUMBER (CRITICAL)                                     | 6. ACRN (CRTICAL)                         |                                  |             | PREPAREDIAUTHORIZED BY:<br>DATE:                       |
| 1. CONT   | SCUNSUN                                   |                                  | •           | PREPARI<br>DATE:                                       |

| AWARD NO.        | SPECIAL REQUIREMENTS                          | MODIFICATION NO. |   |
|------------------|---|------------------|---|
| N00014-12-1-0229 | 0, 20, 12, 12, 12, 12, 12, 12, 12, 12, 12, 12 | P00003           |   |
|                  |   |                  |   |
| •                |   |                  |   |
|                  |   |                  | 1 |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  | 1 |
|                  |   |                  |   |
|                  | ·   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  | 1 |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  | 1 |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  | •   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  | •   |                  |   |
|                  |   |                  | 1 |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  | •   |                  |   |
| -                |   |                  |   |
|                  | . *   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
|                  |   |                  |   |
| į.               |   |                  |   |



3a. ISSUED BY: Office of Naval Research 875 North Randolph Street

| OFFICE UF  |                            |                                 |   | ATTAIL             |                        |                    | Arlington, VA 22203-1995                |            |  |          |  |  |
|--|----------------------------|---------------------------------|---|--------------------|------------------------|--------------------|---|------------|--|----------|--|--|
|  | RITH PARTY                 |                                 |   | ODIFICATION        |                        |                    |   | _          |  |          |  |  |
|  | 11                         |                                 | 1. INSTRUMENT TYPE                      |                    |                        |                    | b. CFDA:                                |            |  |          |  |  |
| NAVAL  | RESEAR                     | Cit                             | Grant                                   |                    |                        |                    | 12.300<br>c. DUNS NUME                  | IFR:       |  |          |  |  |
|  |                            |                                 | 2. AUTHORITY:<br>10 USC 2358,           | 31 USC (           | 6304                   | ľ                  | 0. DOITO TOTAL                          |            |  |          |  |  |
| AWARD NO.:   |                            |                                 | 5. MODIFICATION NO                      | .: 6. MOD          | IFICATION T            | YPE: 7             | . PR NO.:<br>13PR022                    | 0.4 = 0.0  |  |          |  |  |
| N00014-12-1  | -0229                      |                                 | 9. RECIPIENT PROPC                      |                    | rement                 | AL DATE            |   |            | 12. PROGRAM T                          | YPE:     |  |  |
| ACTIVITY/AGENC   | Y PROPOS                   | AL NO.:                         | N/A                                     |                    | 27-SEP                 | -11                |   |            | onr                                    |          |  |  |
| ISSUED TO  | 13b. CAGE                  | I                               | I/EFT NUMBER:                           | 14. REMI           | TTANCE ADI<br>e as blo | )RESS (Ⅱ<br>~k=#1: | F DIFFERENT F                           | -ROM BLOCK | (13):                                  |          |  |  |
| a. ADDRESS:  | 1KVP4                      | 7108                            |   | - 50               | e ab bro               | 011 //             | -                                       |            |  |          |  |  |
| UNIVERSITY OFFICE OF G ADMINISTRAT 70 BUTTERFI AMHERST, MA | RANT AN<br>TION<br>ELD TER | D CONTRAC                       | : AMHERS'T<br>"T                        |                    |                        |                    |   |            |  |          |  |  |
| 3d. BUSINESS OF  | SPRAGUE                    |                                 |   |                    |                        |                    |   |            |  |          |  |  |
| 3e. TELEPHONE N<br>(413) 54506                             | IUMBER: 1                  | 13f. EMAIL ADD<br>sprague@resgs | .umass.edu                              | PROPOSAL T         | ITLE:                  | <u> </u>           |   |            |  |          |  |  |
| 5. RESEARCH TIT<br>Mechanisms                              | LE AND/OR<br>Underly       | DESCRIPTION<br>ring the M       | OF PROJECT AND/OR I<br>Metallic-Like Co | onductiv:          | ity of M               | icrobi             |   |            |  |          |  |  |
| 6. FUNDING   | <u> </u>                   | ACTIVITY/                       | AGENCY SHARE                            | RECIPIENT S        | HARE                   |                    | TOTAL                                   |            | T FUNDING PERIOD                       | )        |  |  |
| REVIOUSLY OBLI   | GATED:                     |                                 | 114,605.00                              | :                  | \$.00                  | •                  | 1,605.00                                |            | N/A<br>THROUGH<br>N/A                  |          |  |  |
| BLIGATED BY TH   | IS ACTION:                 | \$                              | 154,972.00                              | 5                  | \$.00                  |                    | 1,972.00                                |            |  | •        |  |  |
| OTAL OBLIGATE  | ON AWAR                    | D: \$                           | 269,577.00                              |                    | \$.00                  |                    | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | 18, PERIOD | OF PERFORMANCE<br>01-JAN-12<br>THROUGH | <u>.</u> |  |  |
| UTURE FUNDING  | i;                         | \$                              | 368,772.00                              |                    | \$.00                  | ,                  | 8,772.00                                |            | 31-DEC-14                              |          |  |  |
| SRANT TOTAL:   |                            |                                 | 638,349.00                              |                    | \$.00                  | \$63               | 8,349.00                                |            |  |          |  |  |
| 19. ACCOUNTING<br>See attache                              | AND APPRO<br>ed Finar      | PRIATION DAT                    | ra:<br>bunting Data Sh                  |                    |                        |                    |   |            |  | <u> </u> |  |  |
| 20a. PRINCIPAL IN  | VESTIGATO                  | R/RECIPIENT                     | <u> </u>                                | 21. TEC            | HNICAL REP             | RESENT             | ATIVE                                   |            | 21b. CODE:<br>ONR 342                  |          |  |  |
| TECHNICAL REPR   | ESENTATIV                  | E:                              |   |                    | ME: Linda<br>DRESS:    | a A'. C            | hrisey                                  |            | ONR 342                                |          |  |  |
| DEREK R LOV  | LEY                        |                                 |   | Offi               | ice of Na              | aval R             | esearch                                 |            |  |          |  |  |
|  | -                          |                                 |   | 875<br>Arli        | North Raington,        | Andolp<br>VA 222   | h Street<br>03-1995                     |            |  |          |  |  |
|  |                            | 20c. EMAIL AD                   | INDESS:                                 | 21d. TE            | LEPHONE N              | JMBER:             |   | 21e. EMAIL | ADDRESS:                               |          |  |  |
| 20b. TELEPHONE   |                            | 1                               | obio.umass.edu                          | (70                | 3) 696-4               | 504                |   | CHRISELSON | R.NAVY.MIL                             |          |  |  |
| (413) 5459<br>22. AWARDING O                               | FFICE CON                  |                                 | 22b. CODE:                              | 23a. AD            | MINISTRATI             | VE OFFIC           | E:                                      |            | 23b. CODE:<br>N62879                   |          |  |  |
| 22a. NAME: Eli:  | zabeth 1                   | ford                            | ONR BD025                               | ┦                  | -ma poa                | moat M             | 52070                                   |            | NOZO.5                                 |          |  |  |
| 22c. ADDRESS:<br>Office of 1                               | Naval Re                   | esearch                         |   | 495                | REG BOS<br>SUMMER      | STREE'             | r room 62'                              | 7          |  |          |  |  |
| 875 North B  | Randolph                   | 1 Street                        | •                                       | BOS                | TON, MA                | 02210              | -2109                                   |            |  |          |  |  |
| Arlington,   | VA 2220                    | 13-7333                         |   | PHO                | NE: (617<br>: (617)    | 753-4              | - <i>3403</i><br>605                    |            | •                                      |          |  |  |
| 22d, TELEPHONE   | NUMBER:                    | 22e. EMAIL AI                   | DDRESS:                                 |                    | . (                    |                    |   |            |  |          |  |  |
| (703) 696-   | 2576                       | FORDEGONR . N                   | JIM. YVA                                | 25b, C0            | ODE:                   |                    | 26a. PATENT                             | OFFICE:    | 26b. CODE:                             |          |  |  |
| 24. SUBMIT PAYN  | MENT REQU                  |                                 | 25a. PAYING OFFICE:                     | H                  | 100251                 |                    | ŀ                                       |            | N00014                                 |          |  |  |
| Same as bl   | ock #23a                   | 3.                              | DFAS COLUMB-N.<br>COLUMBUS, OH          | AVY ACQ 1<br>43213 | HQ0251                 |                    | One Libe:                               | rty Cente: | r<br>h Street, Suit                    | e 1425   |  |  |
|  |                            |                                 |   |                    |                        |                    | 1                                       |            |  |          |  |  |

|   |                              |                                   | MODIFICATION NO.                                  |                           |
|---|------------------------------|-----------------------------------|---|---------------------------|
| AWARD NO.   | AWARD/MC                     | DIFICATION                        | P00002  |                           |
| N00014-12-1-0229<br>27, SPECIAL INSTRUCTIONS;   |                              |                                   |   |                           |
| See "Special Requirements" At   | tachment                     |                                   |   |                           |
| 266 "Pheciai Kedairemenes iii   |                              |                                   | ·   |                           |
|   |                              |                                   |   | 65 to at (block 00)       |
| 28. DELEGATIONS: The administration duties listed   | below have been delegate     | ed to the administrative office ( | block 23a). Upon request the awarding of          | office contact (block 22) |
| will make their full text available. Please direct ques   | tions to the contacts @: h   | ttp://www.onr.navy.mi             | 1/Contracts-Grants/Regional-                      | -Contacts.aspx            |
| Full Delegation   |                              |                                   |   |                           |
|   |                              |                                   |   |                           |
|   |                              |                                   |   |                           |
|   |                              |                                   |   | ,                         |
|   |                              |                                   |   |                           |
| 29. TERMS AND CONDITIONS: The following term  | s and conditions are incorp  | orated herein by reference wit    | h the same force and effect as if they we         | ere given in full text.   |
| 29. TERMS AND CONDITIONS: The following term<br>Upon request the awarding office contact named in | block 22 will make their ful | text available, or they can be    | found as described below.                         |                           |
| DOCUMENT The following documents may be fo  | und at:                      | <u></u>                           |   |                           |
| The following documents may be fo http://www.onr.navy.mil/Contracts                               | -Grants/submit-pro           | posal/grants-propos               | al/grants-terms-conditions                        | .aspx                     |
| <del>"</del>  |                              |                                   |   |                           |
| UAAC Acceptance C November 2003<br>Agency Specific February 2011                                  |                              |                                   |   |                           |
| UAWA Award A November 2003  |                              |                                   |   |                           |
| Core June 2011  |                              |                                   |   | [                         |
|   |                              |                                   |   |                           |
|   |                              |                                   |   |                           |
| •   |                              |                                   |   |                           |
| 30. OPTIONS OPTION NO.  | AM                           | IOUNT                             | PERIOD  |                           |
| 00.01.110110  |                              |                                   |   |                           |
| (1)<br>(2)  |                              |                                   |   |                           |
| (3)   |                              |                                   |   |                           |
| (4)   | -itted to the indicated addr | esses in the indicated quanti     | ties, within 90 days following the expirati       | on or termination of      |
|   |                              |                                   | Unless otherwise stated in the award/m            | odification, complete     |
| Block 12a of the SF298 as follows: "Approved for F  | Abile Velease, glattinggou   | io Originaliza                    |   | COPIES                    |
| ADDRESSEE   | REPORT 1                     |                                   |   |                           |
| See block #21   | Final                        | Technical Report v                | vith SF298  | ad) 1                     |
|   | Interi                       |                                   | mance Report (As Require                          |                           |
|   | WICH B                       | 1.230                             |   |                           |
|   |                              |                                   |   |                           |
|   | Report                       | of Inventions and                 | Subcontracts - DD 882                             | 1                         |
| See block #23a  | Final                        | Technical Report                  |   | - 4\   1                  |
|   | Interi                       | m Research Perform                | nance Report (As Require<br>Status Report - SF425 | ed)   1<br>-   1          |
|   | Finai                        | ing Line Item 11                  | Scatus Report of 120                              | <u> </u>                  |
|   |                              |                                   | del GEOOG   | 1                         |
| Defense Technical Information   |                              | Technical Report v                | Mance Report (As Require                          | ∍đ) 1                     |
| 8725 John J Kingman Road Ste<br>Fort Belvoir, VA 22060-6218                                       | with S                       |                                   |   |                           |
| Fort Belvoil, VA 22000 0210   |                              |                                   |   |                           |
|   |                              | <u></u>                           | DD 003  | 1                         |
| See block #26a  | Report                       | of Inventions and                 | 1 Subcontracts - DD 882                           | 1                         |
|   |                              |                                   |   |                           |
|   |                              |                                   |   |                           |
|   |                              |                                   |   |                           |
| Naval Research Laboratory   | Final                        | Technical Report                  |   | 1                         |
| ATTN: CODE 5596   |                              |                                   | mance Report (As Requir                           | ed) 1                     |
| 4555 Overlook Avenue SW   | with S                       | 3F298                             |   |                           |
| Washington, DC 20375-5320   |                              |                                   |   |                           |
| 32. FOR THE RECIPIENT   | L                            | 33. FOR THE UNIT                  | ED STATES OF AMERICA                              |                           |
| 32a, SIGNATURE OF PERSON AUTHORIZED T   | O SIGN                       | 33a, SIGNATURE                    | OF AWARDING OFFICER                               |                           |
|   |                              | (b) (6)                           |   |                           |
| N/A - SIGNATURE NOT REQUIR  | ED ON THIS AVVARI            |                                   |   |                           |
|   | 32c: DATE S                  | IGNED 33b, NAME AND T             | TLE OF AWARD OFFICER                              | 33c. DATE SIGNED          |
| 32b. NAME AND TITLE OF SIGNER   | GZC. BAIL C                  | Ellen Simo                        |   | 27-NOV-12                 |

|  | NAVY INTERNAL<br>USE ONLY<br>REF DOC/ACRN                                  | PR#13PR02204-00 FRC:4512 |              |              | for COMPTROLLER, ONR CONTRACT REVIEWED                                |
|--|--|--------------------------|--------------|--------------|---|
|  | AMOUNT<br>(CRITICAL)   | \$154,972.00             | \$154,972.00 | \$154,972.00 | for COMPTROL  |
| FINANCIAL ACCOUNTING DATA SHEET - NAVY  13 MOD (SRITICAL) 13 PRO 0 2 2 2 3 4 - 0 0 | F. G. H. 1. J. K. COST CODE  RFM SA AAA IT PAA PROJ PROJ PDUI  INTO A SUIF | 000                      | PAGE TOTAL   | GRAND TOTAL  | COMPTROLLER APPROVAL:<br>FOR FISCAL DATA AND SIGNATURE<br>BY<br>PATE: |
| T. CONITRACT NUMBER (CRITICAL)  NOO 01 4 - 12 - 1 - 02.29                          | UNITING B. APPROPRIATION SUBHEAD OBJ PARM (CRITICAL) (CRITICAL)            | 1731319 WIAE 410 RA      |              |              | PREPAREDIAUTORIZED BY:  |

| T T Comments   | NAVY INTERNAL USE ONLY L) REF DOC/ACRN |                                  | 00.\$      | \$.00       | for COMPTROLLER, ONR CONTRACT REVIEWED |
|--|--|----------------------------------|------------|-------------|--|
| 2. SPIIN (GRITICAL) 3. MOD (CRITICAL) 4. PR NUMBER 13 PR 02204 - 00 13 PR 02204 - 00 | ATION                                  | This page is intentionally blank | PAGE TOTAL | GRAND TOTAL |  |
| rical.)  | 5. 6. 7. CLINSLIN (CRITCAL)            |                                  |            |             | PREPARED/AUTHORIZED BY:                |

| 11 5 B 11 C                 | ODECIAL DECILIDEMENTS | MODIFICATION NO. |  |
|-----------------------------|-----------------------|------------------|--|
| WARD NO.<br>00014-12-1-0229 | SPECIAL REQUIREMENTS  | P00002           |  |
| 0014-12-1 0225              |                       |                  |  |
|                             |                       |                  |  |
|                             |                       | •                |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       | •                |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       | •                |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       | •                |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |
|                             |                       |                  |  |



3a, ISSUED BY: Office of Naval Research 875 North Randolph Street

| OFF  | ICE OF                       |                             |  |          |                                    |          | Arlington                        | , VA 22203 | 3-1995                      |          |
|--|------------------------------|-----------------------------|--|----------|------------------------------------|----------|----------------------------------|------------|-----------------------------|----------|
|  | /日)                          |                             | MODIFI                                     | CA       | OIT                                | V        |                                  |            |                             |          |
|  | A                            |                             | 1. INSTRUMENT TYPE:                        |          |                                    |          | . CFDA:<br>12.300                |            |                             |          |
| WAVAL  | RESEARC                      |                             | Grant 2. AUTHORITY:                        |          |                                    | 30       | . DUNS NUM                       | BER:       |                             |          |
|  |                              |                             | 10 USC 2358, 31                            | USC      | 6304<br>DIFICATION TY              | (DE: 7   | PR NO.:                          |            | 1                           |          |
| AWARD NO.:   | -0229                        |                             | 5. MODIFICATION NO.:<br>P00001             | Inc      | rement                             | 1        | 12PR039                          |            | 140 500505                  | M TVDE   |
| N00014-12-1<br>ACTIVITY/AGENC  | Y PROPOSAL                   | NO.:                        | 9. RECIPIENT PROPOSAL                      | . NO.:   | 10. PROPOS<br>27-SEP-              |          | : 11. ACTI                       | VITY TYPE: | 12, PROGRA                  | AVLIYPE: |
| N/A  |                              |                             | N/A<br>/EFT NUMBER:                        | 14, REM  | TTANCE ADD                         | RESS (IF | DIFFERENT                        | FROM BLOCK |                             |          |
| 3, ISSUED TO<br>3a, ADDRESS:   | 13b. CAGE:<br>1.KVP4         | 7108                        |  | Sam      | e as blo                           | ck #13   |                                  |            |                             |          |
| UNIVERSITY<br>OFFICE OF G<br>ADMINISTRAT<br>70 BUTTERFI<br>AMHERST, MA | RANT AND<br>'ION<br>ELD TERR | CONTRAC<br>ACE              | AMHERST<br>I                               |          |                                    |          |                                  |            |                             |          |
| 3d. BUSINESS OFF   | ICE CONTAC                   | T:                          |  |          |                                    |          |                                  |            |                             |          |
| CAROL P.<br>3e. TELEPHONE N  | LIMBED: 136                  | . EMAIL ADDI                | RESS:                                      |          |                                    |          |                                  |            |                             |          |
| (413) 54506  | 98 sp                        | rague@resgs.                |  | IDOSAL T | TTI E:                             |          |                                  |            |                             |          |
| 5. RESEARCH TITI<br>Mechanisms   | LE AND/OR DE<br>Underlyi     | SCRIPTION ng the M          | OF PROJECT AND/OR PRO<br>etallic-Like Cond | luctiv   | ity of Mi                          | crobi    | al Nanow                         | ires       |                             |          |
|  |                              |                             |  | IPIENT S |                                    |          | TOTAL                            |            | T FUNDING PER               | RIOD     |
| 6. FUNDING   |                              |                             | OCIO COLUMA                                |          | ΠΑΝ⊑<br>\$.00                      | . \$50   | ,000.00                          |            | N/A<br>THROUGH              |          |
| REVIOUSLY OBLI   | GATED:                       | •                           | 50,000.00                                  |          | •                                  | •        |                                  |            | N/A                         |          |
| BLIGATED BY TH   | IS ACTION:                   | Ś                           | 64,605.00                                  | :        | \$.00                              |          | ,605.00                          | 40 DEDIOD  | OF PERFORMA                 | NCE      |
| OTAL OBLIGATED   | ON AWARD:                    | \$:                         | 114,605.00                                 | ;        | \$.00                              | \$114    | ,605.00                          | IO. PERIOD | 01-JAN-1                    |          |
| UTURE FUNDING  | :                            | \$!                         | 523,744.00                                 |          | \$.00                              | \$523    | ,744.00                          |            | THROUGH<br>31-DEC-1         | 4        |
| GRANT TOTAL:   |                              | Š                           | 538,349.00                                 |          | \$.00                              | \$638    | ,349.00                          |            |                             |          |
| 19. ACCOUNTING A   | AND APPROPI                  | RIATION DAT<br>ial Acco     | A:<br>unting Data Sheet                    | (s)      |                                    |          |                                  |            |                             |          |
|  |                              |                             | n  |          |                                    |          |                                  |            | Odh CODE:                   |          |
| 20a. PRINCIPAL IN  | VESTIGATOR                   | RECIPIENT                   |  | 21. TEC  | HNICAL REPI<br>ME: Linda           | RESENTA  | TIVE<br>hrisev                   |            | 21b. CODE:<br>ONR 3         | 42       |
| TECHNICAL REPR   | ESENTATIVE:                  |                             |  | 21c AD   | DRESS:                             |          |                                  |            |                             |          |
|  |                              |                             |  | 1 875    | ice of Na<br>North Ra<br>ington, V | indolp!  | h Street                         |            |                             |          |
|  | Witanes To                   | c. EMAIL AD                 | DRESS:                                     | 21d. TE  | LEPHONE NU                         | MBER:    |                                  | 21e. EMAIL | ADDRESS:                    |          |
| 20b. TELEPHONE (413) 5459  |                              |                             | obio.umass.edu                             | (70      | 3) 696-4                           | 504      |                                  | CHRISELGON | WR.NAVY.MIL                 |          |
| 22, AWARDING OF  | FICE CONTAC                  | СТ                          | 22b, CODE:                                 | 23a. At  | OMINISTRATIV                       | E OFFIC  | E:                               |            | 23b, CODE:<br>N628          | 79       |
| 22a, NAME: Eliz  | zabeth_Fo                    | rd                          | ONR BD025                                  | ONR      | REG BOST                           | ron n6   | 2879                             |            |                             |          |
| loffice of N   | Naval Res                    | earch                       |  | 495      | SUMMER S                           | STREET   | ROOM 62                          | :7         |                             |          |
| 875 North F<br>Arlington,  | VA 22203                     | -1995                       |  | PHO      | TON, MA                            | 753-     | 3283                             |            |                             |          |
|  |                              |                             |  | FAX      | : (617)                            | 753-46   | 05                               |            |                             |          |
| 22d. TELEPHONE   |                              | 2e. EMAIL AD<br>FORDESONR.N | DDRESS:                                    | L        |                                    |          |                                  |            | look cont                   |          |
| (703) 696-<br>24. SUBMIT PAYN  | 4010 1                       |                             | 25a. PAYING OFFICE:                        | 25b. C   |                                    |          | 26a. PATEN                       | T OFFICE:  | 26b. CODE:<br>NOOC          |          |
| Same as blo  |                              |                             | DFAS COLUMB-NAVY<br>COLUMBUS, OH 432       | ACQ      | HQ0251<br>HQ0251                   |          | ATTN: ON<br>One Libe<br>875 Nort | rtv Cente  | esearch<br>r<br>h Street, S |          |
|  |                              |                             | ·  |          |                                    |          |                                  | -          |                             |          |
| i  |                              |                             |  |          |                                    |          | <u> </u>                         |            |                             |          |

| N00014-12-1-0229  77. SPECIAL INSTRUCTIONS:  28. DELEGATIONS: The administration duties listed below have been delegated to the administrative office (block 23a). Upon request the awarding office contact (block 22) will make their full text available. Please direct questions to the contacts @: http://www.onr.navy.mil/Contracts-Grants/Regional-Contacts.aspx  Full Delegation  29. TERMS AND CONDITIONS: The following terms and conditions are incorporated herein by reference with the same force and effect as if they were given in full text. Upon request the awarding office contact named in block 22 will make their full text available, or they can be found as described below.   | AWARD NO.  | AWARD/MOI                       | DIFICATION                     | MODIFICATION NO.   |                        |
|--|--|---------------------------------|--------------------------------|--|------------------------|
| TRESCRAL INSTRUCTIONS:  THE ECRITICIES The administration dulies based below have been danguated to the administrative office (block, 22a), Upon request the everyflog office content (block) 223 off make hierhal facts available. Pleaso direct questions to the contacts \$\text{0}\$* http://www.onr.navy.mil/Concrects-Orante/Regional-Contacts.aspect Pull Delegation  28. TERMS AND CONCTIONS: The following terms and conditions are incorporated how to by reference with the same faces as fively wave given in full flow, Upon request the available contact named is block if with the following terms and conditions are incorporated how to by reference with the same faces as fively wave given in full flow, Upon request the available, or they can be found at desemble below.  The fall loving adocuments any by the found at:  Intelligence (November 2013)  Apparety Specific rebrurary 2011  TARK Award A November 2003  Apparety Specific rebrurary 2011  TARK Award A November 2003  The following reports must be adminished to the indicator addressees, in the indicated quantities, within 90 days following the expirishen of termination of the property of the property of the following fine property of the following fin   | N00014-12-1-0229   | ATTACA                          |                                | 100001   |                        |
| ### Pull Delegation  22. TERMS AND CONDITIONS. The Edowing tames and conditions are proposed herein by reference with the same force and effect as if they were given in full text. Upon request the awarding aftice and shall be proposed in the proposed for the pr     | 27. SPECIAL INSTRUCTIONS:  |                                 |                                |  | <b>!</b>               |
| ### Pull Delegation  22. TERMS AND CONDITIONS. The Edowing tames and conditions are proposed herein by reference with the same force and effect as if they were given in full text. Upon request the awarding aftice and shall be proposed in the proposed for the pr     |  |                                 |                                |  |                        |
| ### Pull Delegation  22. TERMS AND CONDITIONS. The Edowing tames and conditions are proposed herein by reference with the same force and effect as if they were given in full text. Upon request the awarding aftice and shall be proposed in the proposed for the pr     |  |                                 |                                | the awarding off   | ice contact (block 22) |
| ### Pull Delegation  22. TERMS AND CONDITIONS. The Edowing tames and conditions are proposed herein by reference with the same force and effect as if they were given in full text. Upon request the awarding aftice and shall be proposed in the proposed for the pr     | OF DELEGATIONS: The administration duties listed   | below have been delegated t     | to the administrative office ( | (block 23a). Upon request the awarding on  | loe comact (block 22)  |
| 26. TERMS AND CONDITIONS. The following borns and conditions are incorporated herein by reference with the same force and effect as if they were given in bill text.  Uncontracted the awarding office contect named in bloot 22 will make their full best available, or they can be found at electrical below.  DOCUMENT  The \$collowing documents may be found at:  Interprivate conditions of contects and be found at:  Interprivate conditions of contects and below the conditions of the conditions. The same force and effect as if they were given in bill text.  DAMA Award a November 2003  Agency Specific Pebruary 2011  100. OPTION NO.  AMOUNT  PERIOD  AMOUNT  PERIOD  AMOUNT  PERIOD  The following reports must be submitted to the indicated addressees, in the indicated quantities, within \$0 days following the acquired of the project. Final Technical Report in the swerd/modification, compiled to properly the project. Final Technical Report in the swerd/modification of the project. Final Technical Report in the swerd/modification of the project. Final Technical Report in the swerd/modification of the project. Final Technical Report with \$P258  See block #23a  See block #23a  Period Final Technical Report with \$P258  Interim Research Performance Report (As Required)  Final Technical Report in the swerd of the project of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required)  Final Technical Report in the swerd of the project of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required)  Final Technical Report in the swerd of the project of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required)  Final Technical Report in the swerd of the project of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required)  Final Technical Report in the swerd of the project of Inventions and Subcontracts - DD 882  Final Technical Report in the swerd of the project of the project of Inventions and Subcontracts - DD 882  Final | will make their full text available. Please direct questi  | ons to the contacts @: htt:     | p://www.onr.navy.mi            | 1/Contracts-Grants/Regional-C  | Oncaces.aspx           |
| 26. TERMS AND CONDITIONS. The following borns and conditions are incorporated herein by reference with the same force and effect as if they were given in bill text.  Uncontracted the awarding office contect named in bloot 22 will make their full best available, or they can be found at electrical below.  DOCUMENT  The \$collowing documents may be found at:  Interprivate conditions of contects and be found at:  Interprivate conditions of contects and below the conditions of the conditions. The same force and effect as if they were given in bill text.  DAMA Award a November 2003  Agency Specific Pebruary 2011  100. OPTION NO.  AMOUNT  PERIOD  AMOUNT  PERIOD  AMOUNT  PERIOD  The following reports must be submitted to the indicated addressees, in the indicated quantities, within \$0 days following the acquired of the project. Final Technical Report in the swerd/modification, compiled to properly the project. Final Technical Report in the swerd/modification of the project. Final Technical Report in the swerd/modification of the project. Final Technical Report in the swerd/modification of the project. Final Technical Report with \$P258  See block #23a  See block #23a  Period Final Technical Report with \$P258  Interim Research Performance Report (As Required)  Final Technical Report in the swerd of the project of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required)  Final Technical Report in the swerd of the project of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required)  Final Technical Report in the swerd of the project of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required)  Final Technical Report in the swerd of the project of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required)  Final Technical Report in the swerd of the project of Inventions and Subcontracts - DD 882  Final Technical Report in the swerd of the project of the project of Inventions and Subcontracts - DD 882  Final |  |                                 |                                |  | ļ                      |
| DON TENES THE FOLIOUS ACCEPTANCE OF THE COLOURS AND ACCEPTANCE OF THE COLOURS ACCEPTANCE AC     | Full Detegation  |                                 |                                |  |                        |
| DON TENES THE FOLIOUS ACCEPTANCE OF THE COLOURS AND ACCEPTANCE OF THE COLOURS ACCEPTANCE AC     |  |                                 |                                |  | Ì                      |
| DON TENES THE FOLIOUS ACCEPTANCE OF THE COLOURS AND ACCEPTANCE OF THE COLOURS ACCEPTANCE AC     |  |                                 |                                |  | <b>!</b>               |
| DON TENES THE FOLIOUS ACCEPTANCE OF THE COLOURS AND ACCEPTANCE OF THE COLOURS ACCEPTANCE AC     |  |                                 |                                |  |                        |
| DON TENES THE FOLIOUS ACCEPTANCE OF THE COLOURS AND ACCEPTANCE OF THE COLOURS ACCEPTANCE AC     | AND CONDITIONS: The following terms  | and conditions are incorpora    | ated herein by reference wi    | th the same force and effect as if they were   | e given in full text.  |
| DOCUMENT The Tollowing documents may be found at: The Tollowing may be found at: The Tollowing may be found at: The Tollowing specific Pebruary 2011  30. OPTIONS OPTION NO.  AMOUNT PERIOD  30. OPTION NO. AMOUNT PERIOD  30. OPTION NO. AMOUNT PERIOD  30. OPTION NO. AMOUNT PERIOD  30. OPTION NO. AMOUNT PERIOD  30. OPTION NO. AMOUNT PERIOD  30. OPTION NO. AMOUNT PERIOD  30. OPTION NO. AMOUNT PERIOD  30. OPTION NO. AMOUNT PERIOD  30. OPTION NO. AMOUNT PERIOD  30. OPTION NO. AMOUNT PERIOD  30. OPTION NO. AMOUNT PERIOD  30. OPTION NO. AMOUNT PERIOD  30. OPTION NO. AMOUNT PERIOD  30. OPTION NO. AMOUNT PERIOD  30. OPTION NO. AMOUNT PERIOD  30. OPTION NO. AMOUNT PERIOD  30. OPTION NO. AMOUNT PERIOD  4. AMOUNT PERIOD  5. REPORTS: The following reports must have a SF288, Report Decumentation Pege, accompanying them. Unless otherwise stated in the averation of termination of the project final Technical Report with SF298  5. Example of Period and State of Period and Subcontracts - DD 882  1   | 29. TERMS AND CONDITIONS. The following terms are the swarding office contact named in the state of the same of th | lock 22 will make their full te | xt available, or they can be   | tound as described below.  |                        |
| Agency Specific Pebruary 2011  30. OPTIONS OPTION NO. AMOUNT PERIOD  30. OPTIONS OPTION NO. AMOUNT PERIOD  30. OPTION SOLUTION OPTION NO. AMOUNT PERIOD  31. REPORTS: The following reports must be submitted to the indicated addressees, in the indicated quantilities, within 90 days following the expiration of termination of the project Final Technical Report Solution of the project Final Technical Report No. Approved for Public Release, distablication is Judimetr's Period of the project Final Technical Report with SF298  See block #21  See block #23a  Report of Inventions and Subcontracts - DD 882  Final Technical Report Interium Research Performance Report (As Required)  Final Federal Financial Status Report - SF425 - Including Line Item 11  Defense Technical Information Center 8725 John J Kingman Road Ste 0944 Fort Belvoir, VA 22060-6218  See block #26a  Report of Inventions and Subcontracts - DD 882  Interium Research Performance Report (As Required)  Final Technical Report with SF298 Interium Research Performance Report (As Required)  Including Line Item 11  Naval Research Laboratory Final Technical Report with SF298  Interium Research Performance Report (As Required)  Interium Research Performance Report (As Required)  Final Technical Report with SF298  Interium Research Performance Report (As Required)  Interium Research P     |  |                                 |                                |  | - any                  |
| Agency Specific Pebruary 2011  30. OPTIONS OPTION NO. AMOUNT PERIOD  30. OPTIONS OPTION NO. AMOUNT PERIOD  30. OPTION SOLUTION OPTION NO. AMOUNT PERIOD  31. REPORTS: The following reports must be submitted to the indicated addressees, in the indicated quantilities, within 90 days following the expiration of termination of the project Final Technical Report Solution of the project Final Technical Report No. Approved for Public Release, distablication is Judimetr's Period of the project Final Technical Report with SF298  See block #21  See block #23a  Report of Inventions and Subcontracts - DD 882  Final Technical Report Interium Research Performance Report (As Required)  Final Federal Financial Status Report - SF425 - Including Line Item 11  Defense Technical Information Center 8725 John J Kingman Road Ste 0944 Fort Belvoir, VA 22060-6218  See block #26a  Report of Inventions and Subcontracts - DD 882  Interium Research Performance Report (As Required)  Final Technical Report with SF298 Interium Research Performance Report (As Required)  Including Line Item 11  Naval Research Laboratory Final Technical Report with SF298  Interium Research Performance Report (As Required)  Interium Research Performance Report (As Required)  Final Technical Report with SF298  Interium Research Performance Report (As Required)  Interium Research P     | The following documents may be room to the following open navy mil/Contracts-  | Grants/submit-prop              | osal/grants-propos             | sal/grants-terms-conditions.   | aspx                   |
| Agency Specific Petruary 2011  30. OPTIONS OPTION NO. AMOUNT PERIOD  30. OPTIONS OPTION NO. AMOUNT PERIOD  31. REPORTS: The following reports must be submitted to the indicated addressees, in the indicated quantities, within 90 days following the expiration of termination of 31. REPORTS: The following reports must have a Sf298, Report Documentation Page, accompanying them. Unless otherwise stated in the avariation-diffication, complete the project. Final Technical Report and the avariation-diffication, complete the project. Final Technical Report with Sf298  See block #21  See block #21  See block #23a  Report of Inventions and Subcontracts - DD 882  Final Technical Report (As Required)  Final Federal Financial Status Report - SF425 - 1  Including Line Item 11  Defense Technical Information Center 8725 John J Kingman Road Ste 0944  Fort Belvoir, VA 22060-6218  See block #26a  Report of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required)  Final Technical Report with SF298  Interim Research Performance Report (As Required)  Int     |  |                                 |                                |  |                        |
| UNINA Award A November 2003 Core June 2011  30. OPTIONS OPTION NO. AMOUNT PERIOD  (1) (2) (3) (4) (4) (5) (5) (6) (7) (7) (8) (8) (9) (9) (9) (9) (9) (9) (1) (1) (2) (2) (3) (4) (4) (4) (5) (6) (7) (7) (8) (8) (9) (9) (9) (9) (9) (9) (9) (9) (9) (9   | UAAC Acceptance C November 2003  |                                 |                                |  |                        |
| 30. OPTIONS OPTION NO.  AMOUNT PERIOD  (1) (2) (3) (4) (4) (3) (4) (5) (5) (6) (7) (8) (8) (8) (9) (9) (9) (9) (9) (9) (9) (9) (9) (9  | Agency Specific February 2022<br>TIAWA Award A November 2003   |                                 |                                |  |                        |
| 30. OPTIONS OPTION NO.  (1) (2) (3) (4) 31. REPORTS: The following reports must be submitted to the indicated addressess, in the indicated quantities, within 90 days following the expiration or termination of the project. Final Technical Reports must have a SF238, Report Documentation Page, accompanying them. Unless otherwise stated in the award/modification, complete Block 72 as of the SF298 as follows: "Approved for Public Releases, distribution is Unlimited."  ADDRESSEE  REPORT IYEE  See block #21  Report of Inventions and Subcontracts - DD 882 Interim Research Performance Report (As Required) Interim Research Performance Report (As Re     | Core June 2011   |                                 |                                |  |                        |
| 30. OPTIONS OPTION NO.  (1) (2) (3) (4) 31. REPORTS: The following reports must be submitted to the indicated addressess, in the indicated quantities, within 90 days following the expiration or termination of the project. Final Technical Reports must have a SF238, Report Documentation Page, accompanying them. Unless otherwise stated in the award/modification, complete Block 72 as of the SF298 as follows: "Approved for Public Releases, distribution is Unlimited."  ADDRESSEE  REPORT IYEE  See block #21  Report of Inventions and Subcontracts - DD 882 Interim Research Performance Report (As Required) Interim Research Performance Report (As Re     |  |                                 |                                |  |                        |
| 30. OPTIONS OPTION NO.  (1) (2) (3) (4) 31. REPORTS: The following reports must be submitted to the indicated addressees, in the indicated quantities, within 90 days following the expiration or termination of the project. Final Technical Reports must have a SF238, Report Documentation Page, accompanying them. Unless otherwise stated in the award/modification, complete Block 72 as of the SF298 as follows: "Approved for Public Releases, distribution is bylimited."  ADDRESSEE  REPORT IYPE  See block #21  REPORT TYPE  Final Technical Report with SF298 Interim Research Performance Report (As Required) 1  See block #23a  Report of Inventions and Subcontracts - DD 882 Interim Research Performance Report (As Required) 1  Defense Technical Information Center 8725 John J Kingman Road Ste 0944 Fort Belvoir, VA 22060-6218  Report of Inventions and Subcontracts - DD 882 Interim Research Performance Report (As Required) Interim Research Performan     |  |                                 |                                |  |                        |
| 30. OPTIONS OPTION NO.  (1) (2) (3) (4) 31. REPORTS: The following reports must be submitted to the indicated addressess, in the indicated quantities, within 90 days following the expiration or termination of the project. Final Technical Reports must have a SF238, Report Documentation Page, accompanying them. Unless otherwise stated in the award/modification, complete Block 72 as of the SF298 as follows: "Approved for Public Releases, distribution is Unlimited."  ADDRESSEE  REPORT IYEE  See block #21  Report of Inventions and Subcontracts - DD 882 Interim Research Performance Report (As Required) Interim Research Performance Report (As Re     |  |                                 |                                |  |                        |
| (1) (2) (3) (4) (4) (3) (4) (4) (5) (6) (7) (8) (8) (8) (9) (9) (9) (1) (1) (2) (3) (4) (4) (4) (5) (4) (5) (4) (6) (7) (8) (8) (8) (9) (9) (9) (9) (9) (9) (9) (9) (9) (9   | OO OPTIONS OPTION NO   | AMO                             | UNT                            | PERIOD   |                        |
| (2) (3) (4) 31. REPORTS: The following reports must be submitted to the indicated addressees, in the indicated quantities, within 90 days following the expiration or termination of the project Final Technical Reports must have a SF298, Report Documentation Page, accompanying them. Unless otherwise stated in the award/modification, complete the project Final Technical Report and the award/modification, complete the project Final Technical Report with SF298  See block #21  See block #21  See block #23a  Report of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required) with SF298  Interim Research Performance Report (As Required) the private final Federal Financial Status Report - SP425 - Including Line Item 11  Defense Technical Information Center 8725 John J Kingman Road Ste 0944  Fort Belvoir, VA 22060-6218  Report of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required) with SF298  Report of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required) with SF298  Report of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required) with SF298  Naval Research Laboratory  ATTN: CODE 5596  4555 Overlook Avenue SW  Washington, DC 20375-5320  See Sorte Recipient  322 SGN HE RECIPIENT  323 SIGNATURE OF PERSONAUTHORIZED TO SIGN  NIA SIGNATURE OF PERSONAUTHORIZED TO SIGN  NIA SIGNATURE NOT REQUIRED ON THIS AWARD  336. DATE SIGNED  | 00, 01 110114  |                                 |                                |  |                        |
| (3) (4) (4) (4) (4) (4) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4   | (2)  |                                 |                                |  |                        |
| (4)  1. REPORTS: The following reports must be submitted to the indicated addresses, in the indicated quantities, within 90 days following the expiration or termination of the project. Final Technical Reports must have a SF298, Report Documentation Page, accompanying them. Unless otherwise stated in the award/modification, complete the project. Final Technical Report with SF298 as follows: "Approved for Public Release, distribution is Unlimited."  REPORT TYPE  See block #21  See block #21  REPORT TYPE  Final Technical Report with SF298  Interim Research Performance Report (As Required) with SF298  REPORT TYPE  Final Technical Report interim Research Performance Report (As Required) the project of Inventions and Subcontracts - DD 882 including line Item 11  Defense Technical Information Center 3725 John J Kingman Road Ste 0944 Fort Belvoir, VA 22060-6218  See block #26a  Report of Inventions Report with SF298  Interim Research Performance Report (As Required) with SF298  Interim Research Performance Report (As Required) with SF298  Report of Inventions and Subcontracts - DD 882 1  Naval Research Laboratory ATTN: CODE 5596  4555 Overlook Avenue SW Washington, DC 20375-5320  32. FOR THE RECIPIENT  NIA * SIGNATURE OF PERSON AUTHORIZED TO SIGN  NIA      | (3)  |                                 |                                |  |                        |
| the project. Final Technical reports miss and subscontracts of the ST298 as follows: "Approved for Public Release; distribution is Unlimited."  REPORT TYPE  See block #21  See block #21  See block #23a  Report of Inventions and Subcontracts - DD 882 Final Technical Report Interim Research Performance Report (As Required) with SF298  Report of Inventions and Subcontracts - DD 882 Final Technical Report Interim Research Performance Report (As Required) With SF298  See block #26a  Report of Inventions and Subcontracts - DD 882  Report of Inventions and Subcontracts - DD 882  Final Technical Report Interim Research Performance Report (As Required) With SF298  Report of Inventions and Subcontracts - DD 882  Final Technical Report Interim Research Performance Report (As Required) With SF298  Naval Research Laboratory Interim Research Performance Report (As Required) With SF298  See block #26a  Report of Inventions and Subcontracts - DD 882  Final Technical Report Interim Research Performance Report (As Required) With SF298  See block #26a  Report of Inventions and Subcontracts - DD 882  1  Naval Research Laboratory Interim Research Performance Report (As Required) With SF298  See block #26a  Report of Inventions and Subcontracts - DD 882  1  Naval Research Laboratory Interim Research Performance Report (As Required) With SF298  See block #26a  Report of Inventions and Subcontracts - DD 882  See block #26a  Report of Inventions and Subcontracts - DD 882  1  Naval Research Laboratory Interim Research Performance Report (As Required) With SF298  See block #26a  See block #26a  Report of Inventions and Subcontracts - DD 882  1  See block #26a  See      | 1 / 45   | w                               | sees in the indicated quan     | tities, within 90 days following the expiratio   | n or termination of    |
| REPORT TYPE  See block #21  See block #23a  Report of Inventions and Subcontracts - DD 882 Final Technical Report with SF298  Report of Inventions and Subcontracts - DD 882 Final Technical Report (As Required) with SF298  Report of Inventions and Subcontracts - DD 882 Final Technical Report (As Required) Final Federal Financial Status Report - SF425 - Including Line Item 11  Defense Technical Information Center 8725 John J Kingman Road Ste 0944 Fort Belvoir, VA 22060-6218  Report of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required) with SF298  Report of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required) with SF298  Interim Research Performance Report (As Requir     | 31. REPORTS: The following reports must be subm  | itted to the indicated address  | Page, accompanying them        | <ul> <li>Unless otherwise stated in the award/mo</li> </ul>  | ditication, complete   |
| ADDRESSEE  See block #21  See block #21  Report of Inventions and Subcontracts - DD 882 Interim Research Performance Report (As Required) with SF298  Report of Inventions and Subcontracts - DD 882 Interim Research Performance Report (As Required) With SF298  See block #26a  Report of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required) With SF298  Report of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required) With SF298  Naval Research Laboratory Interim Research Performance Report (As Required) With SF298  Interim Research Performance Report (As Required) With SF298  See block #26a  See block #26a  Report of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required) With SF298  See block #26a  See block #26a  Report of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required) With SF298  See block #26a  See block #26a  Report of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required) With SF298  See block #26a  See b     | Rlock 12a of the SF298 as follows: "Approved for P   | Mana traitment                  |                                |  | COPIES                 |
| Final Technical Report with Sk298   Interim Research Performance Report (As Required) with SF298   |  | REPORTIT                        | r G                            |  |                        |
| Interim Research Performance Report (No Koquinal With SF298   With SF298   |  | Final Te                        | echnical Report                | with SF298   | 1                      |
| See block #23a  Report of Inventions and Subcontracts - DD 882 1 Final Technical Report Interim Research Performance Report (As Required) 1 Final Federal Financial Status Report - SF425 - Including Line Item 11  Defense Technical Information Center 3725 John J Kingman Road Ste 0944 Fort Belvoir, VA 22060-6218  Final Technical Report with SF298 Interim Research Performance Report (As Required) 1 With SF298  Report of Inventions and Subcontracts - DD 882 1  Naval Research Laboratory ATTN: CODE 5596 Washington, DC 20375-5320  Report of Inventions and Subcontracts - DD 882 1  Final Technical Report with SF298  Final Technical Report (As Required) 1 Interim Research Performance Report (As Required) 2 With SF298  Final Technical Report with SF298  Final Technical Report of Inventions and Subcontracts - DD 882 1  See block #26a  Report of Inventions and Subcontracts - DD 882 1  See block #26a  Report of Inventions and Subcontracts - DD 882 1  See block #26a  Report of Inventions and Subcontracts - DD 882 1  See block #26a  Report of Inventions and Subcontracts - DD 882 1  See block #26a  Report of Inventions and Subcontracts - DD 882 1  See block #26a  Report of Inventions and Subcontracts - DD 882 1  See block #26a  Report of Inventions and Subcontracts - DD 882 1  See block #26a  Report of Inventions and Subcontracts - DD 882 1  See block #26a  Report of Inventions and Subcontracts - DD 882 1  See block #26a  Report of Inventions and Subcontracts - DD 882 1  See block #26a  Report of Inventions and Subcontracts - DD 882 1  See block #26a   | See DIOCK #21  |                                 |                                | mance Report (No Noquer  |                        |
| Final Technical Report Interim Research Performance Report (As Required) Final Federal Financial Status Report - SF425 - Including Line Item 11  Defense Technical Information Center 8725 John J Kingman Road Ste 0944 Fort Belvoir, VA 22060-6218  See block #26a  Report of Inventions and Subcontracts - DD 882  Naval Research Laboratory ATTN: CODE 5596 4555 Overlook Avenue SW Washington, DC 20375-5320  32 FOR THE REGIPIENT 32a SIGNATURE OF PERSON AUTHORIZED TO SIGN  N/A - SIGNATURE NOT REQUIRED ON THIS AWARD  Tinterim Research Performance Report (As Required) I Therim Research Performance Report (As Required) I The     |  | with Sr.                        | 298                            |  |                        |
| Final Technical Report Interim Research Performance Report (As Required) Final Federal Financial Status Report - SF425 - Including Line Item 11  Defense Technical Information Center 8725 John J Kingman Road Ste 0944 Fort Belvoir, VA 22060-6218  See block #26a  Report of Inventions and Subcontracts - DD 882  Naval Research Laboratory ATTN: CODE 5596 4555 Overlook Avenue SW Washington, DC 20375-5320  32 FOR THE REGIPIENT 32a SIGNATURE OF PERSON AUTHORIZED TO SIGN  N/A - SIGNATURE NOT REQUIRED ON THIS AWARD  Tinterim Research Performance Report (As Required) I Therim Research Performance Report (As Required) I The     |  |                                 |                                |  |                        |
| Final Technical Report Interim Research Performance Report (As Required) Final Federal Financial Status Report - SF425 - Including Line Item 11  Defense Technical Information Center 8725 John J Kingman Road Ste 0944 Fort Belvoir, VA 22060-6218  See block #26a  Report of Inventions and Subcontracts - DD 882  Naval Research Laboratory ATTN: CODE 5596 4555 Overlook Avenue SW Washington, DC 20375-5320  32 FOR THE REGIPIENT 32a SIGNATURE OF PERSON AUTHORIZED TO SIGN  N/A - SIGNATURE NOT REQUIRED ON THIS AWARD  Tinterim Research Performance Report (As Required) I Therim Research Performance Report (As Required) I The     |  | Percet                          | of Inventions ar               | nd Subcontracts - DD 882   | _                      |
| Interim Research Performance Report (As Required) Final Federal Financial Status Report - SF425 - 1 Including Line Item 11  Defense Technical Information Center 17 8725 John J Kingman Road Ste 0944 Fort Belvoir, VA 22060-6218  Final Technical Report with SF298 Interim Research Performance Report (As Required) With SF298  Report of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required) Interim Research Performance Report (As Required) With SF298  Report of Inventions and Subcontracts - DD 882  Interim Research Performance Report (As Required) Interim Researc     | See block #23a   | 1                               | - wheel doll Donort            |  |                        |
| Defense Technical Information Center 8725 John J Kingman Road Ste 0944 Fort Belvoir, VA 22060-6218  See block #26a  Report of Inventions and Subcontracts - DD 882  Naval Research Laboratory ATTN: CODE 5596 4555 Overlook Avenue SW Washington, DC 20375-5320  32 FOR THE RECIPIENT 32a SIGNATURE OF PERSON AUTHORIZED TO SIGN  N/A - SIGNATURE NOT REQUIRED ON THIS AWARD  Including Line Item 11  Final Technical Report with SF298  Therrim Research Performance Report (As Required) 1  Interim Research Performance Report (As Required) 1  33. FOR THE UNITED STATES OF AMERICA 33a. SIGNATURE OF AWARDING OFFICER (b) (6)   |  |                                 | Begarrah Darfor                | mance Report (As Require   | .α, <u>1</u>           |
| Defense Technical Information Center 8725 John J Kingman Road Ste 0944 Fort Belvoir, VA 22060-6218  See block #26a  Report of Inventions and Subcontracts - DD 882  Naval Research Laboratory ATTN: CODE 5596 4555 Overlook Avenue SW Washington, DC 20375-5320  Report of Inventions and Subcontracts - DD 882  Final Technical Report Interim Research Performance Report (As Required) 1  Interim Research Performance Report (As Required) 1  See block #26a  Report of Inventions and Subcontracts - DD 882  Final Technical Report Interim Research Performance Report (As Required) 1  See block #26a  Report of Inventions and Subcontracts - DD 882  Final Technical Report Interim Research Performance Report (As Required) 1  See block #26a  Report of Inventions and Subcontracts - DD 882  Final Technical Report Interim Research Performance Report (As Required) 1  See block #26a  Report of Inventions and Subcontracts - DD 882  Final Technical Report Interim Research Performance Report (As Required) 1  See block #26a  Report of Inventions and Subcontracts - DD 882  Final Technical Report Interim Research Performance Report (As Required) 1  See block #26a   | į  | Final F                         | ederal Financial               | Status Report - 51423  | †                      |
| Defense Technical Information Center 8725 John J Kingman Road Ste 0944 Fort Belvoir, VA 22060-6218  See block #26a  Report of Inventions and Subcontracts - DD 882  Naval Research Laboratory ATTN: CODE 5596 4555 Overlook Avenue SW Washington, DC 20375-5320  32 FOR THE RECIPIENT  33 FOR THE RECIPIENT  33 FOR THE UNITED STATES OF AMERICA  33 SIGNATURE OF PERSON AUTHORIZED TO SIGN  N/A - SIGNATURE NOT REQUIRED ON THIS AWARD  1 Signature OF AWARD OFFICER  33 NAME AND TITLE OF AWARD OFFICER  34 NAME AND TITLE OF AWARD OFFICER  35 NAME AND TITLE OF AWARD OFFICER  35 NAME AND TITLE OF AWARD OFFICER  |  |                                 |                                |  | 1                      |
| 8725 John J Kingman Road Ste U944 Fort Belvoir, VA 22060-6218  Report of Inventions and Subcontracts - DD 882  Report of Inventions and Subcontracts - DD 882  I See block #26a  Report of Inventions and Subcontracts - DD 882  I See block #26a  Report of Inventions and Subcontracts - DD 882  I See block #26a  Report of Inventions and Subcontracts - DD 882  I See block #26a  See block #26a  Report of Inventions and Subcontracts - DD 882  I See block #26a  See block #26a  See block #26a  Report of Inventions and Subcontracts - DD 882  I See block #26a  See block #26a  Report of Inventions and Subcontracts - DD 882  I See block #26a  S     | Pafango Technical Information  | Center Final T                  | echnical Report                | with SF298   | 1                      |
| See block #26a  Report of Inventions and Subcontracts - DD 882  Naval Research Laboratory ATTN: CODE 5596 4555 Overlook Avenue SW Washington, DC 20375-5320  Therm Research Performance Report (As Required) With SF298  32. FOR THE RECIPIENT 32a. SIGNATURE OF PERSON AUTHORIZED TO SIGN  N/A - SIGNATURE NOT REQUIRED ON THIS AWARD.  1 22c. DATE SIGNED 33b. NAME AND TITLE OF AWARD OFFICER 33c. DATE SIGNED  | 19725 John J Kingman Road Ste  | [[G44] ] TIYEEY TIE             | Research Perior                | mance report on the Hall   |                        |
| Naval Research Laboratory ATTN: CODE 5596 4555 Overlook Avenue SW Washington, DC 20375-5320  32 FOR THE RECIPIENT 32a SIGNATURE OF PERSON AUTHORIZED TO SIGN  N/A - SIGNATURE NOT REQUIRED ON THIS AWARD  33b. NAME AND TITLE OF AWARD OFFICER 33c. DATE SIGNED 33b. NAME AND TITLE OF AWARD OFFICER 33c. DATE SIGNED  | Fort Belvoir, VA 22060-6218  | with Sr                         | 290                            |  |                        |
| Naval Research Laboratory ATTN: CODE 5596 4555 Overlook Avenue SW Washington, DC 20375-5320  32 FOR THE RECIPIENT 32a SIGNATURE OF PERSON AUTHORIZED TO SIGN N/A - SIGNATURE NOT REQUIRED ON THIS AWARD  33b. NAME AND TITLE OF AWARD OFFICER 33c. DATE SIGNED 33c. DATE SIGNED  |  |                                 |                                |  |                        |
| Naval Research Laboratory ATTN: CODE 5596 4555 Overlook Avenue SW Washington, DC 20375-5320  32 FOR THE RECIPIENT 32a SIGNATURE OF PERSON AUTHORIZED TO SIGN N/A - SIGNATURE NOT REQUIRED ON THIS AWARD  33b. NAME AND TITLE OF AWARD OFFICER 33c. DATE SIGNED 33c. DATE SIGNED  | 100  | Report                          | of Inventions ar               | nd Subcontracts - DD 882   | 1                      |
| Naval Research Laboratory ATTN: CODE 5596 4555 Overlook Avenue SW Washington, DC 20375-5320  32 FOR THE RECIPIENT 32a SIGNATURE OF PERSON AUTHORIZED TO SIGN  N/A - SIGNATURE NOT REQUIRED ON THIS AWARD  33. FOR THE UNITED STATES OF AMERICA 33a. SIGNATURE OF AWARDING OFFICER (b) (6)  33c. DATE SIGNED 33b. NAME AND TITLE OF AWARD OFFICER 33c. DATE SIGNED  | See block #26a   | ļ                               |                                |  |                        |
| Naval Research Laboratory ATTN: CODE 5596 4555 Overlook Avenue SW Washington, DC 20375-5320  32 FOR THE RECIPIENT 32a SIGNATURE OF PERSON AUTHORIZED TO SIGN  N/A - SIGNATURE NOT REQUIRED ON THIS AWARD  33. FOR THE UNITED STATES OF AMERICA 33a. SIGNATURE OF AWARDING OFFICER (b) (6)  33c. DATE SIGNED 33b. NAME AND TITLE OF AWARD OFFICER 33c. DATE SIGNED  |  |                                 |                                |  | -                      |
| Naval Research Laboratory ATTN: CODE 5596 4555 Overlook Avenue SW Washington, DC 20375-5320  32 FOR THE RECIPIENT 32a SIGNATURE OF PERSON AUTHORIZED TO SIGN  N/A - SIGNATURE NOT REQUIRED ON THIS AWARD  33. FOR THE UNITED STATES OF AMERICA 33a. SIGNATURE OF AWARDING OFFICER (b) (6)  33c. DATE SIGNED 33b. NAME AND TITLE OF AWARD OFFICER 33c. DATE SIGNED  |  |                                 |                                |  |                        |
| Naval Research Babatasary ATTN: CODE 5596 4555 Overlook Avenue SW Washington, DC 20375-5320  32. FOR THE RECIPIENT 32a. SIGNATURE OF PERSON AUTHORIZED TO SIGN  N/A - SIGNATURE NOT REQUIRED ON THIS AWARD  33. FOR THE UNITED STATES OF AMERICA 33a. SIGNATURE OF AWARDING OFFICER (b) (6)  33c. DATE SIGNED 33b. NAME AND TITLE OF AWARD OFFICER 33c. DATE SIGNED  |  |                                 | Tanhaigal Basart               |  |                        |
| ATTN: CODE 53.50  4555 Overlook Avenue SW Washington, DC 20375-5320  32 FOR THE RECIPIENT  32 SIGNATURE OF PERSON AUTHORIZED TO SIGN  N/A - SIGNATURE NOT REQUIRED ON THIS AWARD  330, NAME AND TITLE OF AWARD OFFICER  330, DATE SIGNED  330, NAME AND TITLE OF AWARD OFFICER  330, DATE SIGNED   | Naval Research Laboratory  | Final                           | ecnnical Repole                | rmance Report (As Require  | ed)   1                |
| Washington, DC 20375-5320  32. FOR THE RECIPIENT.  33. FOR THE UNITED STATES OF AMERICA  33. SIGNATURE OF PERSON AUTHORIZED TO SIGN.  33. SIGNATURE OF AWARDING OFFICER  (b) (6)  N/A - SIGNATURE NOT REQUIRED ON THIS AWARD  33. SIGNATURE OF AWARDING OFFICER  (b) (6)  33. SIGNATURE OF AWARDING OFFICER  33. DATE SIGNED  33. NAME AND TITLE OF AWARD OFFICER  33. DATE SIGNED   | ATTENT CODE 5596   | with Si                         | 7298                           | <del>-</del>   |                        |
| 32. FOR THE RECIPIENT 32a. SIGNATURE OF PERSON AUTHORIZED TO SIGN  N/A - SIGNATURE NOT REQUIRED ON THIS AWARD  33. FOR THE UNITED STATES OF AMERICA 33a. SIGNATURE OF AWARDING OFFICER (b) (6)  33c. DATE SIGNED 33b. NAME AND TITLE OF AWARD OFFICER 33c. DATE SIGNED   | 4555 Overlook Avenue SW  | 1                               |                                |  |                        |
| 32 FOR THE RECIPIENT  32a. SIGNATURE OF PERSON AUTHORIZED TO SIGN  N/A - SIGNATURE NOT REQUIRED ON THIS AWARD  33a. SIGNATURE OF AWARDING OFFICER  (b) (6)  (b) (6)  33c. DATE SIGNED  33b. NAME AND TITLE OF AWARD OFFICER  33c. DATE SIGNED  | Washington, DC 20375-3320  |                                 |                                | The second secon |                        |
| 32a. SIGNATURE OF PERSON AUTHORIZED TO SIGN.  (b) (6)  N/A - SIGNATURE NOT REQUIRED ON THIS AWARD  (b) (6)  33b. NAME AND TITLE OF AWARD OFFICER  33c. DATE SIGNED   | ON FOR THE RECIPIENT   |                                 | 33, FOR THE UN                 | ITED STATES OF AMERICA   |                        |
| N/A - SIGNATURE NOT REQUIRED ON THIS AWARD    320 DATE SIGNED   33b, NAME AND TITLE OF AWARD OFFICER   33c, DATE SIGNED   33c,      | 328 SIGNATURE OF PERSON AUTHORIZED T   | OSIGN                           |                                | E OF AVVARDING OFFICER   |                        |
| 32C DATE SIGNED 33b. NAME AND TITLE OF AWARD OFFICER 33c. DATE SIGNED  |  |                                 | (b) (6)                        |  |                        |
| 32C PATE/SIGNED 33b, NAME AND TITLE OF AVVAIL OF FIGURE  | N/A - SIGNATURE NOT REQUIF   | ED ON THIS WAY                  |                                |  |                        |
|  |  | I 202 DATES                     | GNED 33b, NAME AND             | TITLE OF AWARD OFFICER   | 1                      |
|  | 32b. NAME AND TITLE OF SIGNER  | 320, 574, 504                   |                                |  | 19-MAR-12              |

|   | NAVY INTERNAL<br>USE ONLY | REF DOC/ACRN  |   |             |             | for COMPTROLLER, ONR CONTRACT REVIEWED                 |
|---|---------------------------|---------------|---|-------------|-------------|--|
|   |                           | 17.53         |   | 00          | 00          | ROLLER   |
|   | AMOUNT                    | (CRITICAL)    | 20.00.000.0000.0000.0000.0000.0000.000        | \$64,605.00 | \$64,605.00 | for COMPT  |
|   | т-                        | POLI<br>& SUF | 5120  | PAGE TOTAL  | GRAND TOTAL |  |
|   | COST CODE                 |               | o<br>o<br>o                                   |             | GRAND       | Ē  |
| 1) 3. MOD (CRITICAL) 4. PR NUMBER<br>1.2 PR 0.3 9.3 9 - 0.1     |                           | PROJ<br>UNIT  | 04 5 0 2 5 0 2 5 0 5 0 5 0 5 0 5 0 5 0 5 0    |             | ,           |  |
| PR NUMBER<br>12 PR 03 939-01                                    | <u> </u>                  | <u> </u>      |   |             |             |  |
| 4. PR   | J.<br>PAA                 |               | 0<br>0<br>0<br>0<br>0<br>0<br>0<br>0          | +           |             | VATURE   |
|   | <u>-</u> =                |               | Q 2   |             |             | AND SIGN   |
|   | H,                        | (CRITICAL)    | 0 6 8 3 4 2 2 4 2 4 2 4 2 4 2 4 2 4 2 4 2 4 2 |             | 100000      | COMPTROLLER APPROVAL:<br>FOR FISCAL DATA AND SIGNATURE |
| MOD (CRITICAL<br>POCOCI   | 0 d                       |               | 0   |             |             | PTROLLE<br>FOR FIS                                     |
| 3. MOD (  | F.                        | E Z           | 24.<br>20.                                    |             |             | COME   |
|   | E C                       |               | AS S S S S S S S S S S S S S S S S S S        |             |             |  |
| CAL)  |                           | 33            |   |             |             |  |
| 2. SPIIN (CRITICAL)   | C.                        | (CRITICAL)    | WIAE WIAE                                     |             |             |  |
|   | T T T                     | (CRITICAL)    | 1721319                                       |             |             |  |
| 1. CONTRACT NUMBER (CRITICAL)<br>NO 0 0 1 4 - 1 2 - 1 - 0 2 2 9 | 엉                         | (CRITICAL)    | AA.   |             |             | PREPARED/AUTORIZED BY:                                 |
| 1. CONTRACT<br>NO 0 0 1 4 -                                     | CLINSLIN                  |               |   |             |             | PREPARED   |

ONR AWARD FORM (10/99) - version 1.1

| A. A   | NAVY INTERNAL<br>USE ONLY<br>REF DOC/ACRN |                                  |             | for COMPTROLLER, ONR CONTRACT REVIEWED                       |
|--|---|----------------------------------|-------------|--|
|  |   |                                  | \$.00       | TROLLER, ONR CON   |
|  | 8.<br>AMOUNT<br>(CRITICAL)                |                                  |             | for COMP   |
| 2. SPIN (CRITICAL) 3. MOD (CRITICAL) 4. PR NUMBER 12. SPIN (CRITICAL) 12. SPIN (CRITICAL) 12. SPIN (CRITICAL) 12. SPIN (CRITICAL) 13. MOD (CRITICAL) 14. PR NUMBER 15. SPIN (CRITICAL) 15. | ATION                                     | This page is intentionally blank | GRAND TOTAL | COMPTROLLER APPROVAL: FOR FISCAL DATA AND SIGNATURE BY DATE: |
| 1. CONTRACT NUMBER (CRITICAL) NO 0014-12-1-0229  | 5. 6. ACRN (CRITICAL)                     |                                  |             | PREPAREDIAUTHORIZED BY:<br>DATE:                             |

| WARD NO.<br>100014-12-1-0229 | SPECIAL REQUIREMENTS       | MODIFICATION NO. P00001 |  |
|------------------------------|----------------------------|-------------------------|--|
|                              | This page is intentionally | blank                   |  |
|                              |                            |                         |  |
|                              |                            |                         |  |
|                              |                            |                         |  |
|                              |                            |                         |  |